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1911.

"Omnes res creatæ sunt divinæ sapientiæ et potentiæ testes, divitiæ felicitatis humanæ:—ex harum usu *bonitas* Creatoris; ex pulchritudine *sapientia* Domini; ex œconomiâ in conservatione, proportione, renovatione, *potentia* majestatis elucet. Earum itaque indagatio ab hominibus sibi relictis semper æstimata; à verè eruditis et sapientibus semper exculta; malè doctis et barbaris semper inimica fuit."—Linnæus.

"Quel que soit le principe de la vie animale, il ne faut qu'ouvrir les yeux pour voir qu'elle est le chef-d'œuvre de la Toute-puissance, et le but auquel se rapportent toutes ses opérations."—Bruckner, *Théorie du Système Animal*, Leyden, 1767.

. . . . . The sylvan powers
Obey our summons; from their deepest dells
The Dryads come, and throw their garlands wild
And odorous branches at our feet; the Nymphs
That press with nimble step the mountain-thyme
And purple heath-flower come not empty-handed,
But scatter round ten thousand forms minute
Of velvet moss or lichen, torn from rock
Or rifted oak or cavern deep: the Naiads too
Quit their loved native stream, from whose smooth face
They crop the lily, and each sedge and rush
That drinks the rippling tide: the frozen poles,
Where peril waits the bold adventurer's tread,
The burning sands of Borneo and Cayenne,
All, all to us unlock their secret stores
And pay their cheerful tribute.

J. Taylor, *Norwich*, 1818.



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[EIGHTH SERIES.]


"..... per litora spargite muscum,
Naiades, et circùm vitreos considite fontes:
Pollice virgineo teneros hìc carpite flores:
Floribus et pictum, divæ, replete canistrum.
At vos, o Nymphæ Craterides, ite sub undas;
Ite, recurvato variata corallia trunco
Vellite muscosis e rupibus, et mihi conchas
Ferte, Deæ pelagi, et pingui conchylia succo."
*N. Parthenii Giannettasi*, Ecl. 1.


No. 43. JULY 1911.


## I.—*Descriptions of some new Species of* Blattidæ.


By R. Shelford, M.A., F.L.S.


[Plate I.]

*Hemithyrsocera testacea*, sp. n.

♂. Rufo-testaceous, head darker. Pronotum trapezoidal, margined anteriorly and laterally with opaque testaceous. Tegmina extending slightly beyond the apex of the abdomen; 15 costals, radial vein bifurcate from near the base, 7 longitudinal discoidal sectors, anterior ulnar 3-ramose. Wings hyaline; veins flavous, mediastinal vein 3-ramose, radial vein bifurcate from near base; 9 costals, the first six incrassated, ulnar simple, triangular apical area not very conspicuous. Supra-anal lamina triangular, not exceeding the subgenital lamina, which is asymmetrical, slightly produced, with one minute style (the right), and one larger, hidden under the lamina. Opening of scent-gland on seventh abdominal tergite. Legs testaceous, tibiæ tipped with fuscous; front femora with a complete row of spines beneath, the more distal short.

Total length 13 mm.; length of body 12 mm.; length of tegmina 11 mm.; pronotum 3 × 4 mm.

Erythræa, Ghinda, Cheren.

Type in Oxford University Museum.

*Ischnoptera lunaris*, sp. n.

♂. Pale testaceous. Head with a broad castaneous stripe extending from between the eyes to the clypeus; vertex testaceous, occiput castaneous. Antennæ testaceous. Pronotum trapezoidal, a castaneous vitta on each side of the disc, the vittæ narrowly contiguous anteriorly. Tegmina with a narrow castaneous vitta extending from the base of the radial vein throughout three-fifths of the costal field; radial vein bifurcate, about 15 costals, 8 longitudinal discoidal sectors, both ulnar veins ramose. Wings hyaline, mediastinal vein 3-ramose, radial vein bifurcate, about 8 costals; ulnar vein 6-ramose, 4 rami being incomplete; a moderately prominent apical triangle. Abdomen testaceous; supra-anal lamina transversely quadrate, its posterior margin sinuate; subgenital lamina exceeding the supra-anal lamina, asymmetrical, its apex produced to form a minute lobe curved upwards and inwards and beset with setæ; one minute style (the left). Cerci moderate, testaceous. Legs testaceous; front femora with a complete row of spines on the anterior margin beneath.

Total length 14 mm.; length of body 11 mm.; length of tegmina 12 mm.; pronotum 2·5 × 4 mm.

Queensland, Peak Downs (*Godeffroy*). Two examples only.

Allied to *Ischnoptera manicata*, Tepper.

Type in the Stockholm Museum.

*Ischnoptera jocosa*, sp. n.

♂. Head piceous or dark castaneous; genæ, ocelli, and mouth-parts testaceous. Antennæ infuscated. Pronotum trapezoidal, piceous, margined all round with testaceous, more narrowly anteriorly and posteriorly than laterally. Tegmina pale castaneous, outwardly margined with testaceous, base of principal veins dark castaneous; radial vein bifurcate, about 14 costals, 7–8 longitudinal discoidal sectors. Wings hyaline; mediastinal vein ramose, radial vein bifurcate; 8 costals with incrassated apices; ulnar vein with 3–4 rami, 1 being incomplete; a small and ill-defined apical triangle. Abdomen rufo-castaneous. Supra-anal lamina trigonal, apex notched; subgenital lamina almost symmetrical, apex faintly emarginate and furnished with one sharply pointed style

curved upwards and backwards. Cerci infuscated. Legs testaceous; front femora with a complete row of spines on anterior margin beneath.

♀. Similar, but supra-anal lamina sharply triangular, apex not emarginate, surpassed by the semiorbicular, ample subgenital plate.

Total length 11 mm.; length of body (♂) 8, (♀) 7 mm.; length of tegmina 8·5 mm.; pronotum 2·5 × 3 mm.

Queensland, Peak Downs (*Godeffroy*). Three specimens.

Types in the Stockholm Museum.

This species is transitional to the genus *Blattella*, Caud., as typified by *B. germanica*, L., but on account of the incomplete ramus of the vena ulnaris alarum I prefer to place it in *Ischnoptera*.

*Mareta scripta*, sp. n.

♂. General colour sordid testaceous. Head with a band between the eyes, two lines on the frons, and two spots just above the clypeus castaneous. Antennæ pale testaceous at base, remainder infuscated. Pronotum transversely elliptical, lateral margins broadly hyaline, disc with castaneous dots and lines arranged in a symmetrical pattern. Tegmina and wings exceeding the apex of the abdomen. Tegmina with all the veins bordered with quadrangular spots of pale brown; radial vein simple, 13 costals, discoidal sectors numerous, oblique, posterior ulnar simple. Wings hyaline; mediastinal vein biramose; 8 costals, the more proximal with incrassated apices, the first crossing the lower mediastinal branch; ulnar vein 4- to 5-ramose; an inconspicuous apical triangle. Supra-anal lamina transverse; subgenital lamina produced at the apex into a lobe terminating in two styliform processes, the genital styles situated on either side of this lobe. Cerci and legs testaceous, the former fusco-maculate towards apex.

Total length 11 mm.; length of body 7·5 mm.; length of tegmina 9 mm.; pronotum 2 × 3 mm.

Queensland, Peak Downs (*Godeffroy*). Three specimens.

Type in the Stockholm Museum.

Owing to the structure of the subgenital lamina the male looks as if it had four genital styles. Superficially the insect resembles *Phyllodromia ceylonica*, Br. (synonyms, *P. punctulata*, Br., *P. nimbata*, Shelf.), but the structural characters of alary organs and femora establish its generic identity as here given. The colouring of the tegmina, moreover, is quite characteristic of *Mareta*.

*Mareta godeffroyi*, sp. n.

♀. Head piceous, mouth-parts castaneous. Antennæ castaneous at base, remainder piceous. Pronotum trapezoidal, sordid testaceous, with two broad, irregular, castaneous vittæ; a small testaceous spot situated in the outer border of each vitta. Tegmina and wings exceeding apex of abdomen. Tegmina testaceous, with all the intervenular spaces filled with castaneous; marginal area very broad, radial vein simple; 13 costals, the last two multiramose; discoidal sectors oblique, posterior ulnar simple. Wings with the veins fuscous; mediastinal vein anastomosing at apex with the first costal, radial simple; 9 costals, their apices clavate; ulnar vein with 4 rami; apical triangle inconspicuous. Abdomen above and beneath rufo-castaneous, heavily bordered with piceous; supra-anal lamina triangular, apex deeply notched; subgenital lamina semiorbicular, ample. Cerci piceous, 13-jointed. Legs rufo-testaceous, suffused with darker.

Total length 12 mm.; length of body 11 mm.; length of tegmina 11 mm.; pronotum 3 × 5 mm.

Queensland, Peak Downs and Gayndah (*Godeffroy*). Two examples.

Type in the Stockholm Museum.

Closely allied to *Mareta subtilis*, Brunn. (= *Phyllodromia subtilis*). It may be noted here that the chief diagnostic characters of the genus *Mareta*, Bol., are the oblique discoidal sectors of the tegmina, the ramose ulnar vein of the wings, an inconspicuous apical triangle, and the front femora with the anterior margin beneath armed only with close-set setæ.

*Stylopyga immunda*, sp. n.

♂. Piceous, nitid. Labrum ochreous. Antennæ castaneous. Tegmina lobiform. Seventh abdominal tergite triangularly produced, almost concealing the supra-anal lamina, which is subtriangular, with the apex produced to a point; the margins of the lamina are serrated. Subgenital lamina quadrate, with two stout genital styles. Cerci flattened, acuminate. Legs with the femora castaneous; second posterior tarsal joint armed, the other joints unarmed, their pulvilli large; tarsal arolia present.

♀. Similar, but the seventh abdominal tergite less strongly produced; supra-anal lamina posteriorly concavely emarginate.

Total length, (♂) 27, (♀) 26 mm.; pronotum (♂ ♀) 9–10 × 12 mm.

Queensland. Three specimens.

Type in the Stockholm Museum.

Allied to *S. coxalis*, Walk., from Ceram and New Guinea, but differing in the form of the supra-anal lamina of the male.

*Stylopyga proposita*, sp. n. (Pl. I. fig. 1.)

♂. Piceous, nitid. Labrum and clypeus castaneous; palpi piceous. Antennæ castaneous. Tegminal rudiments absent. Seventh abdominal tergite obtusely produced. Supra-anal lamina sharply triangular, surpassing the subgenital lamina, which is rounded, sides not notched; styles straight, spiniform. Cerci flattened, moderate. Posterior metatarsus longer than succeeding joints; all the pulvilli minute, apical; arolia absent.

♀. Similar, but supra-anal lamina obtusely produced, apex truncate.

Total length (♂ ♀) 24 mm.; pronotum 7·5 × 10 mm.

Java, Batavia, Tanah-Abang (*P. Serre*, 1904). Two examples.

Types in the Paris Museum.

*Stylopyga maindroni*, sp. n.

♂. Head piceous, with the mouth-parts castaneous; antennæ piceous at base, remainder fuscous. Thoracic tergites rufo-castaneous; pronotum heavily bordered with piceous; a triangular piceous blotch on each side of the meso- and metanotum. No tegminal rudiments. Abdomen above dark castaneous at base, becoming piceous towards the apex. Seventh abdominal tergite obtusely produced. Supra-anal lamina bluntly triangular. Abdomen beneath rufous, margined with piceous. Subgenital lamina rounded; styles straight, not spiniform, rufous. Cerci flattened, piceous. Legs rufous. Posterior metatarsus equal in length to the succeeding joints, second tarsal joint armed beneath; pulvilli of moderate size; arolia absent.

Total length 18 mm.; pronotum 6 × 7·5 mm.

Nilghiris, Coonoor (*Maindron*, 1902). One example.

Type in the Paris Museum.

The Oriental and Australian species of the genus *Stylopyga*, as defined by me in Gen. Insect., Blattidæ, Subfam. Blattinæ, fasc. 109 (1910), can be distinguished by the following

synoptical key. The well-known and cosmopolitan species *S. rhombifolia*, Stoll, and the gaudy *S. ornata*, Br. (figured in the above-cited memoir), are omitted.

| | |
|---|---|
| 1. Wings represented by squamiform lobes. | |
| 2. Unicolorous species ..... | *quadrilobata*, Br. (Celebes.) |
| 2′. Pronotum and tegminal rudiments margined with ochreous ..... | *salomonis*, Shelf. (Solomon Is.) |
| 1′. Wings entirely absent. | |
| 2. Tegminal rudiments present. | |
| 3. Thorax and abdomen above with rufous maculæ ..... | *sex-pustulata*, Walk. (S. India, ? Java.) |
| 3′. Unicolorous species. | |
| 4. Tegminal rudiments transversely truncate, almost square ..... | *picea*, Br. (Nicobar Is.) |
| 4′. Tegminal rudiments with apex rounded, elliptical. | |
| 5. Pulvillus of second joint of posterior tarsus small, apical ..... | *semoni*, Kr. (Java.) |
| 5′. Pulvillus of second joint of posterior tarsus larger, occupying half the joint ..... | *immunda*, sp. n. (Queensland.) |
| 2′. Tegminal rudiments absent. | |
| 3. Unicolorous species. | |
| 4. Coxæ not margined with testaceous. | |
| 5. Pulvilli of posterior tarsus minute, apical ..... | *proposita*, sp. n. (Java.) |
| 5′. Pulvilli large, occupying the greater part of the tarsal joints ..... | *parallela*, Bol. (S. India.) |
| 4′. Coxæ margined with testaceous. | |
| 5. Seventh abdominal tergite strongly produced backwards, almost hiding the supra-anal lamina.... | *coxalis*, Walk. (Ceram, New Guinea.) |
| 5′. Seventh abdominal tergite scarcely produced ..... | *michaelseni*, Shelf.* (W. Australia.) |
| 3′. Body above anteriorly rufo-castaneous, posteriorly piceous ..... | *maindroni*, sp. n. (S. India.) |

*Stylopyga togoensis*, sp. n. (Pl. I. fig. 2.)

♂. Piceous, nitid, impunctate. Antennæ castaneous, mouth-parts testaceous. Tegmina represented by squamiform lobes, scarcely extending beyond the mesonotum. Posterior angles of abdominal tergites scarcely produced, seventh tergite shortly produced; supra-anal lamina shortly trigonal, exceeded by the subgenital lamina, which is subquadrate and produced, its apex slightly emarginate. Genital styles bifurcate; the outer limb long, curved, and flattened, the inner

* Accidentally omitted from my Gen. Insect. memoir. The reference is:—Blattidæ [*in*] Fauna S.W.-Australiens (Michaelsen & Hartmeyer), Vol. ii. Lfg. 9, p. 140 (1909).

limb short and terminating in four teeth. Cerci stout, 10-jointed. Legs castaneous; posterior tarsi elongate, the second joint spined beneath.

Length 13 mm.; pronotum 5·1 × 6 mm.

Togo, Misahöhe (*E. Baumann*).

Type in the Berlin Museum.

*Blatta rufo-cercata*, sp. n.

♀. Piceous. Pronotum with an elongate rufous macula on each lateral margin. Tegmina subquadrate, obliquely truncate, sutural margins touching, just reaching the first abdominal tergite, seriate-punctate. Scutellum not exposed. Wings minute, lobiform, completely hidden by the tegmina. Seventh abdominal tergite obtusely produced, margin not sinuate. Supra-anal lamina cucullate, subtruncate. Cerci short, rufous. Femora rather sparsely armed; tarsi rufo-castaneous, their structure quite typical of the genus; arolia absent.

Total length 15 mm.; length of tegmina 3 mm.; pronotum 4 × 6 mm.

Manila (*Leveillé*, 1877). Two examples.

Type in the Paris Museum.

*Pseudoderopeltis morosa*, sp. n.

♂. Head castaneous, antennæ fuscous. Pronotum piceous, trapezoidal, with two oblique impressions; membranous processes of meso- and metanotum moderately long and slender. Tegmina castaneous, considerably exceeding the apex of the abdomen. Wings suffused with castaneous, median vein bifurcate and ramose; a small intercalated apical triangle. Abdomen piceous; supra-anal lamina trigonal, subgenital lamina rounded, styles long and slender. Legs castaneous.

♀. Piceous, nitid, impunctate. Clypeus testaceous; antennæ rufescent. Tegminal rudiments barely extending beyond the mesonotum. Posterior angles of abdominal tergites 5–7 produced, seventh tergite with posterior margin very convex; supra-anal lamina cucullate, triangular, emarginate. Legs castaneous; posterior tarsi rather short, second joint not spined beneath, its pulvillus large.

♂. Total length 25 mm.; length of body 19 mm.; length of tegmina 21 mm.; pronotum 6 × 7 mm.

♀. Length of body 21 mm.; length of tegmina 4 mm.; pronotum 6 × 9 mm.

Chinchoxo (*Falkenstein*). Several examples.

Types in the Berlin Museum.

*Pseudoderopeltis togoensis*, sp. n.

♂. Very like *P. morosa*, but smaller; pronotum castaneous; membranous processes of meso- and metanotum obsolescent; tegmina paler towards apex; median vein of wings not bifurcate, anastomosing irregularly with the radial vein; no intercalated triangle; supra-anal lamina more produced, apex slightly emarginate.

Total length 22 mm.; length of body 16 mm.; length of tegmina 18 mm.; pronotum 4·5 × 6 mm.

Togo, Bismarckburg (*R. Büttner*). Several examples.

Type in the Berlin Museum.

*Euthyrrapha vittata*, sp. n. (Pl. I. fig. 3.)

♀. Body and head piceous, with sparse erect pubescence. Antennæ piceous. Tegmina castaneous, with a broad orange vitta extending from the base to near the apex. Wings hyaline, with the apex castaneous and an orange stigma on the costa; ulnar vein with 6 rami. Supra-anal lamina subquadrate; subgenital lamina ample, with the apex deeply cleft. Cerci slender, acuminate. Legs castaneous, the tibial spines rufous.

Length of body 6 mm.; length of tegmina 5 mm.; length of wings 7 mm.; pronotum 2 × 3 mm.

N. Kamerun (*Conradt*).

Type in the Berlin Museum.

*Holocompsa capsoides*, sp. n. (Pl. I. figs. 6 *a*, 6 *b*.)

♂. Piceous, with a scant, recumbent, rufous pubescence. Mouth-parts castaneous. Pronotum trapezoidal; scutellum exposed, conspicuous. Wings in repose extending somewhat beyond the tegmina. Tegmina with the mediastinal and anal areas, a space between them, and a triangular patch (the base of the triangle extending from the apex of the anal area to the apex of the mediastinal area, its apex at a point situated halfway on the outer margins of the tegmen) coriaceous, the remainder of the tegmen membranous, hyaline, with a fuscous suffusion at the apex; mediastinal and anal veins conspicuous, the other veins obsolescent or absent. Wings hyaline, with the posterior margin broadly suffused with fuscous; a large fuscous stigma on the anterior margin formed by a fusion of the mediastinal rami and of the proximal costals; the bases of the ulnar and first axillary veins are moderately robust, otherwise the venation of the wing is obsolescent. Supra-ana lamina shortly trigonal,

surpassed by the subgenital lamina, which is trapezoidal and furnished with two slender styles. Cerci slender. Legs castaneous.

Total length 6·2–7 mm.; length of tegmina 5–5·6 mm.; pronotum 1·8 × 2·5 mm.

Lower Ogowé, between Lambarene and the sea (*E. Haug*, 1901). Two examples.

Type in the Paris Museum.

Allied to *H. minutissima*, de Geer, but distinguished *inter alia* by the obsolescent venation.

### Genus Nymphrytria, nov.

Form semiglobular. Antennæ extremely short, incrassated; the first joint elongate, equal to one-quarter of the total length of the antennæ, the second and third joints as long as broad, the remaining joints transverse. Frons above the clypeus bullate. Body fringed with long stiff hairs. Pronotum anteriorly produced strongly, completely covering the head, posterior margin convex. Posterior angles of seventh abdominal tergite acutely produced. Cerci minute, hidden, unjointed. Posterior tibiæ subquadrangular, the spines on the outer aspect biseriately arranged, those on the inner aspect uniseriately arranged; the spines serrated and grooved. Tarsi slender, fimbriate, without pulvilli and without claws.

### *Nymphrytria mirabilis*, sp. n. (Pl. I. fig. 4.)

♀. Pale testaceous, tibial spines castaneous. Antennæ with 32 joints. Eyes wide apart. Hairs fringing the body testaceous. Pronotum finely granulate and with a few minute hairs; disc with two transverse impressions and a faintly impressed median line. Meso- and metanotum and the first three abdominal tergites smooth, nitid. Abdominal tergites 4–6 finely granulate in the middle. Supra-anal lamina rounded, margin entire, surpassing the subgenital lamina, which is semiorbicular, its posterior margin indented on either side, the tuberculiform cerci visible in the notches. Femora and tibiæ short and robust, tarsi slender. Femora armed on both margins beneath with a few minute spines, the spines at the apical angles arranged in little groups of 3 or 4; no genicular spines. Front tibiæ very short, with 8 apical spines and 1 free spine, the longest spine not equal to the length of the first tarsal joint; mid tibiæ with 7 spines on the outer aspect, biseriately arranged, 5 apical spines, no spines on the inner aspect, the longest apical spine equal in length to the tibia, but not so long as the first tarsal joint;

hind tibiæ quadrangular, flattened from side to side, broader at the apex than at the base, 6 spines on the outer aspect biseriately arranged, 4 long spines in a single row on the inner aspect near the apex, 5 apical spines, the longest of which is not quite equal to the first tarsal joint. Tarsi slender, the metatarsi exceeding in length the remaining joints, fimbriate and entirely without pulvilli or claws.

Length 12 mm.; greatest breadth 10 mm.; pronotum 6×8 mm.

Tunis, Gafsa.

Type in the St. Petersburg Museum.

This highly remarkable species is an extreme development of the genus *Anisogamia*, Sauss.; it resembles that genus in the form and fimbriation of the body, in the length of the first antennal joint, in the concealed and rudimentary cerci, and, to a certain extent, in the armature of the femora. It differs from *Anisogamia* by the extremely short antennæ, by the form of the pronotum, by the femoral armature, and by the simplification of the tarsal structure. The pronotum of *Nymphrytria* in its shape resembles that of the males of *Polyphaga* species in its anterior production. The tarsal structure is unique amongst the Blattidæ, and it would be interesting to learn if its simplification and the serration of the tibial spines are correlated with peculiar habits of life; that the species, like most of the *Polyphagæ*, has burrowing habits is sufficiently indicated by the structure of the fore tibiæ, which, as digging instruments, must rival in efficiency those of *Gryllotalpa*.

*Polyphaga platypoda*, sp. n. (Pl. I. fig. 5.)

♀. Rufo-castaneous, rufo-fimbriate. Antennæ short and somewhat incrassated, with 36–40 joints, the apical of which are moniliform. Pronotum slightly produced anteriorly, completely covering the head, together with the meso- and metanotum granulate and with a sparse erect pubescence; disc with chiselled markings. Abdomen smooth, nitid. Supra-anal lamina subtransverse. Subgenital lamina and cerci as in the preceding genus. Legs short, robust. Femora with a few minute spines on both margins beneath; no genicular spines. All the tibial spines robust, grooved beneath, and finely serrated. Front tibiæ as in the preceding species; mid tibiæ with spines on the outer aspect triseriately arranged, none on the inner aspect, 5 apical spines, the longest not equal to the first tarsal joint; hind tibiæ curved, spines on the outer aspect triseriately arranged in two groups,

3 spines on the inner aspect arranged in a single oblique row, 7 apical spines, the longest exceeding in length the first tarsal joint. Tarsi elongate, the metatarsi of the first and second pairs of legs flattened and grooved, considerably exceeding in length the succeeding joints ; the second to fourth joints of the mid tarsi also grooved and flattened ; the posterior metatarsi not grooved, shorter than the first and second pairs. Claws slender, without arolia.

Length 16 mm.; greatest breadth 11 mm.; pronotum 6·5 × 8·1 mm.

Tunis, Gafsa.

Type in the St. Petersburg Museum.

A singular species, belonging to the same group as *P. africana*, L., but differing in the peculiar tarsal structure and in the single row of spines on the inner aspect of the hind tibiæ, a character also presented by the genera *Anisogamia* and *Nymphrytria*.

*Chorisoneura australica*, sp. n.

♀. Form ovate, depressed. Head very flattened, frons highly polished; testaceous. Antennæ pale testaceous. Pronotum hyaline, with two broad rufescent vittæ ; very broad in proportion to length, anteriorly broadly emarginate, so that the vertex of the head is freely exposed, posteriorly truncate, exposing the small testaceous scutellum. Tegmina and wings not exceeding apex of abdomen. Tegmina with very broad hyaline marginal area, disc rufescent; mediastinal vein very robust, extending throughout two-fifths of the tegmen-length, but failing to reach the outer margin, the first three costals abutting on it; radial vein simple, 9 costals, 1 ulnar vein with 4 oblique rami, the discoidal and anal areas reticulated. Wings hyaline ; radial vein curved ; 10 costals, all rising from the posterior third of the radial vein, their apices incrassated, forming a conspicuous "stigma"; medio-discal area twice as broad as medio-ulnar area, crossed by a few transverse venules; ulnar vein biramose, the rami united by anastomoses ; a large apical area, its base acutely angulate, in repose folded on the top of the wing. Abdomen rufescent above, testaceous beneath, broad; supra-anal lamina triangular, deeply incised at the apex; subgenital lamina ample, posterior margin widely and faintly emarginate. Cerci long, rufo-testaceous. Legs testaceous.

Total length 8 mm.; length of tegmina 6·5 mm.; pronotum 2 × 3·8 mm.

Queensland, Cape York (*Thorey*) ; Rockhampton, Gayndah (*Godeffroy*). Five specimens.

Type in the Stockholm Museum.

The ootheca is chitinous and carried with the suture uppermost.

*Chorisoneura delicatula*, sp. n.

♀. Allied to the preceding species, but much larger and differing in the following points:—Colour pale testaceo-hyaline, disc of pronotum opaque testaceous. Pronotum anteriorly less conspicuously emarginate. Tegmina with bases of mediastinal and radial veins opaque testaceous, some of the intervenular spaces filled with rufo-testaceous; mediastinal vein longer, 16–18 costals, 6 or 7 abutting on the mediastinal vein; ulnar vein with 9 oblique rami. Wings with 14 costals, not forming a "stigma."

Total length 11 mm.; length of body 7·5 mm.; length of tegmina 8·5 mm.; pronotum 3 × 4·8 mm.

Queensland, Peak Downs (*Godeffroy*), and Cape York (*Thorey*). Two examples.

Type in the Stockholm Museum.

The genus *Chorisoneura*, Br., is here recorded for the first time from Australia; originally regarded as purely Neotropical, recently its range has been shown to extend into West Africa and the Indian subregion. It is possible that when the genus has been thoroughly revised it will be necessary to separate off the two Australian species under a different generic name, for they differ somewhat from the extra-Australian species; but, pending such a revision, they may be regarded as outlying members of the rather loosely defined genus *Chorisoneura*.

*Blabera lindmani*, sp. n.

♂. Allied to *B. immacula*, Sauss. & Zehnt., from Pernambuco. Head piceous, frons not flattened, interspace between eyes about equal to the length of the first two antennal joints. Pronotum unicolorous castaneous, striated anteriorly and posteriorly; disc with a few impressions; form similar to that of *B. immacula*. Tegmina pale fuscous, bases of the mediastinal and radial veins darker. Wings hyaline, with marginal area narrowly testaceous, outer margin sinuate. Abdomen above wood-brown, beneath rufescent margined with castaneous. Supra-anal lamina bilobate; subgenital lamina slightly asymmetrical, notched on the right side, two styles. Cerci very short. Legs castaneous; femora entirely unarmed beneath, formula of apical spines $\frac{0}{2}$, $\frac{1}{1}$, $\frac{1}{0}$, front

femora with no genicular spines; posterior metatarsi short, unarmed, all the pulvilli very large; no arolia between the tarsal claws.

Total length 42 mm.; length of body 32 mm.; length of tegmina 32 mm.; pronotum 10 × 14 mm.

Brazil (*C. Lindman*). One example only.

Type in the Stockholm Museum.

*Panesthia froggatti*, sp. n.

♀. Allied to *P. kheili*, Bol., and with almost identical pronotal structure, but tegmina and wings reduced to squamiform rudiments, their apices obliquely truncate. Outer margins of seventh abdominal tergite faintly crenulate, the apical tooth directed outwards as well as backwards; margin of supra-anal lamina dentate.

Total length 37 mm.; length of tegmina 7·2 mm.; pronotum 10 × 14 mm.

Solomon Islands (*W. W. Froggatt*).

Type in Oxford University Museum.

EXPLANATION OF PLATE I.

*Fig.* 1. Apex of abdomen of *Stylopyga proposita*, sp. n., ♂. Dorsal aspect.

*Fig.* 2. Apex of abdomen of *Stylopyga togoensis*, sp. n., ♂. Dorsal aspect. Note the large genital styles.

*Fig.* 3. *Euthyrrapha vittata*, sp. n., ♀. × 6.

*Fig.* 4. Left hind tibia and tarsus of *Nymphrytria mirabilis*, gen. et sp. n., ♀.

*Fig.* 5. Left mid tibia and tarsus (from below) of *Polyphaga platypoda*, sp. n., ♀.

*Fig.* 6. *a*, Left tegmen, *b*, Right wing of *Holocompsa capsoides*, sp. n., ♂.

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II. — *The Classification of the Teleostean Fishes of the Order Ostariophysi.*—1. *Cyprinoidea.* By C. Tate Regan, M.A.

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[Plate II.]

The order Ostariophysi includes a number of types which are very divergent in form and appearance, but which agree in the possession of the remarkable Weberian mechanism,

forming a communication between the air-bladder and the internal ear *.

Each *ductus endolymphaticus* unites with its fellow and gives rise to a backwardly directed median diverticulum, the *sinus endolymphaticus*, lying in a cavity of the basioccipital which is roofed by laminar inward expansions of the exoccipitals. This cavity, the *cavum sinus imparis*, communicates anteriorly with the perilymph spaces surrounding the internal ear, and posteriorly, where its bony roof terminates, gives rise to a pair of lateral cavities, the *atria sinus imparis*. The wall of each *atrium* is partly membranous and is in part formed by two ossicles, *claustrum* and *scaphium*, which represent the supra-neural and neural arches of the first vertebra; a ligament connects the *scaphium* with the *tripus*, a triangular or triradiate bone mainly formed of the rib of the third vertebra, but in the Characiformes clearly including the parapophysis also; in the connecting ligament may appear the *intercalarium*, primarily representing the neural arch of the second vertebra. The air-bladder is typically divided into anterior and posterior portions; the former is supported by the *os suspensorium*, either the parapophysis or rib of the fourth vertebra, or perhaps both, and in its wall is inserted the posterior process of the *tripus*. The other portions of the *tripus* and the *intercalarium* lie in the cavity of the *saccus paravertebralis*, a membranous sac filled with a semigelatinous fluid; in the more generalized types this sac communicates anteriorly with the subdural lymph spaces of the cranium through a lateral occipital foramen at the side of the *foramen magnum*.

Sagemehl thought that the Ostariophysi were related to *Amia*, but there can be little doubt that they are allied to generalized Clupeoids such as the Elopidæ. The Characiformes are the least specialized of the Ostariophysi, and the absence of a splenial, the presence of an endochondral supraoccipital, the ossified mesocoracoid, the complete vertebral centra, without caudal intercentra, and the homocercal structure of the caudal fin show that they are far removed from *Amia* and are closely related to the Isospondyli.

The Ostariophysi may be divided into two well-marked suborders, Cyprinoidea and Siluroidea; the classification of the former is the subject of the present memoir. The

* On the Weberian mechanism of the Cyprinoidea see especially Sagemehl, Morph. Jahrb. x. 1885, p. 102; Sörensen, Vid. Selsk. Skr. Copenhagen, (6) vi. 1892, p. 131; Bridge and Haddon, Phil. Trans. clxxxiv. (B), 1893, p. 65; Bloch, Jenaisch. Zeitschr. xxxiv. 1900, p. 1.

Cyprinoids are malacopterous physostomes * with the pelvic fins, when present, abdominal; the head is naked and the body is usually scaly; the branchiostegals are few, 3–5. Parietal bones are present, either meeting in the middle line or separated by a fontanel, and an orbitosphenoid is always present; the metapterygoid and symplectic are well developed; most of the parapophyses are distinct from the centra (except in *Misgurnus*) and the anterior vertebræ remain separate, or only the centra of the second and third may unite; epipleurals and epineurals are present.

The suborder Cyprinoidea includes three well-marked divisions—Characiformes, Gymnotiformes, and Cypriniformes.

### Division 1. Characiformes †.

Body deep or moderately elongate; dorsal and caudal fins well developed; pelvic fins present; usually an adipose fin. Mouth typically non-protractile; jaws usually toothed and maxillary rarely excluded from the gape. Upper and lower pharyngeals dentigerous, normally opposed. An opisthotic; posterior temporal fossæ well developed, with two or three posterior apertures. Hyopalatine and opercular bones all present; palatine firmly attached to pterygoid and mesopterygoid. Post-temporal forked. Air-bladder large, free, divided into two by a transverse constriction.

This group comprises several hundred species from the fresh waters of Central and South America and Africa; it corresponds to the family Characidæ or Characinidæ of authors ‡.

#### Family 1. Characidæ.

Præmaxillaries not much produced; maxillaries well developed. Teeth in jaws usually strong; palate sometimes toothed. Hyomandibular two-headed, the posterior head inserted in a groove of the pterotic, the anterior with flat or concave surface articulating with a flat or convex surface on the sphenotic; pterygoid narrowed posteriorly, immovably attached to quadrate or mesopterygoid. Orbito-sphenoid

* Many Cobitidæ and Homalopteridæ, with the air-bladder reduced and encapsuled, are physoclists.

† Sagemehl, Morph. Jahrb. x. 1885, p. 102, has written a valuable memoir on the cranial osteology. Gill, Proc. U.S. Nat. Mus. xviii. 1895, p. 205, gives a list of some other papers of lesser importance.

‡ *Cf.* Bouleng. Camb. Nat. Hist., Fish. p. 575 (1904), and Cat. Afr. Freshwater Fish. i. p. 174 (1909); Eigenmann, Reports Princeton Exped. Patagon. iii. Zool. pts. 3 (1909) & 4 (1910).

forming a sutural union with frontals. Hypocoracoids separate, often forming a pair of flat vertical laminæ which are apposed in the middle line; pectoral radials usually 4, compressed and somewhat elongate, articulating with a ridge on the hypercoracoid. Scales cycloid. Dorsal fin median or posterior, short or of moderate length.

Chiefly carnivorous fishes from the fresh waters of Central and South America and Africa.

The principal genera may be arranged thus :—

I. Præmaxillaries fixed, firmly attached to the mesethmoid; maxillaries usually movable, rarely adherent to præmaxillaries.

A. Abdomen not serrated.

1. Teeth on the palatines or pterygoids: American.

*a*. Anal fin short; no fontanel.

Lateral line present, running straight along middle of side; teeth in jaws conical, with canines; a band of teeth on each side of the palate; hypocoracoids not in contact. (*Erythrininæ*.) ..... *Erythrinus, Hoplias.*

Lateral line absent; teeth in jaws rather small, tricuspid; a few small teeth on each side of the palate; hypocoracoids forming vertical laminæ which are apposed in the middle line. (*Lebiasininæ*.) *Lebiasina, Piabucina.*

*b*. Anal fin long; lateral line more or less decurved; hypocoracoids forming median vertical laminæ; teeth in jaws conical, with canines.

A series of conical teeth on each pterygoid; base of pectoral fin rather short. (*Acestrorhamphinæ*.) ..... *Oligosarcus, Acestrorhamphus, Acestrorhynchus.*

Minute granular teeth on pterygoid and mesopterygoid; base of pectoral fin very long. (*Cynodontinæ*.)..... *Cynodon.*

2. Palate toothless; lateral line usually decurved; hypocoracoids forming median vertical laminæ.

*a*. Præmaxillary with a posterior toothed process lying between maxillary and pterygoid*; teeth conical, with canines: African. (*Sarcodacinæ*.) .... *Sarcodaces.*

*b*. Præmaxillary normal. (*Characinæ*.)

*a*. Mesethmoid very large ..... *Chalceus, Plethodectes, Pyrrhulina, Pogonocharax.*

*β*. Mesethmoid of moderate size.

Teeth usually in 2 to 4 series in the præmax-

* In *Sarcodaces*, as in many Characiformes with the snout produced, the pterygoids extend to the vomer below or internal to the palatines, which retain their lateral ethmoid attachment.

illaries, compressed, notched or denticulated ..... *Bryconæthiops*, Alestes*, Petersius*, Brycon, Chalcinus, Henochilus, Bryconops, Creagrutus, Deuterodon, Pseudochalceus, Crenuchus†, Scissor, Bramocharax, Tetragonopterus, Astyanax, Stichanodon†, Iguanodectes, Hemibrycon, Paragoniates, Gymnocharacinus, Diapoma, Corynopoma, Pseudocorynopoma, Stethaprion, Brachychalcinus.*

Teeth in 2 series in the præmaxillaries, the outer or both conical or subconical; anal of moderate length ..... *Salminus, Hystricodon, Agoniates.*

Teeth uniserial, compressed, serrated incisors; mouth small ..... *Chirodon, Odontostilbe, Piabuca.*

Teeth uniserial, compressed, pointed, notched or denticulated; mouth larger ..... *Aphiocharax, Mimagoniates, Leptagoniates.*

Teeth uniserial, conical, without canines; anal not very elongate..... *Phoxinopsis, Ctenocharax.*

Teeth conical, with canines; anal fin very long ..... *Charax, Roeboides, Cynopotamus.*

B. Abdomen keeled and serrated, bearing a median series of sharp-edged bony plates with backwardly directed points: American. (*Serrasalmoninæ.*) ..... *Mylesinus, Pygocentrus, Pygopristis, Serrasalmo, Myletes.*

II. Præmaxillaries movable; maxillaries firmly united by suture with the præmaxillaries: African. (*Hydrocyoninæ.*) *Hydrocyon.*

The Characinæ correspond to about fourteen of Eigenmann's subfamilies; many of these are certainly natural groups, inasmuch as they include but a single genus or two or three closely related genera. *Iguanodectes*, *Gymnocharacinus*, *Diapoma*, *Corynopoma*, *Stichanodon*, and *Stethaprion* are apparently quite as near to *Tetragonopterus* and *Astyanax* as the latter are to *Brycon*, and, in my opinion, nothing is gained by making them the types of separate subfamilies.

*Chalceus* and *Plethodectes* are placed by Eigenmann in the Piabucininæ, which he distinguishes from the Tetragonopterinæ by the absence of fontanels, a character of very slight importance. In the Characiformes the presence of fontanels is probably sometimes a primitive feature, sometimes not; they have often become reduced or have disappeared or have not developed, especially in those forms with the upper surface of the head flattish and the occipital crest low.

* These genera are African, the other Characinæ American.

† Teeth uniserial, but these genera are apparently related to the genera with biserial teeth, after which they are placed.

*Distichodus* has fontanels, but *Nannocharax* has not; *Hemiodus* has fontanels, but *Parodon* has not; most species of *Alestes* have fontanels, but in *Alestes macrolepidotus* they are absent and the parietals are united by suture. I could give other examples, but these will suffice.

*Chalceus* has the mouth and dentition of *Brycon* and is certainly related to that genus; on the other hand, the large scales, the short anal fin, the flattish head, &c. suggest relationship to *Pyrrhulina*, which is confirmed by the large size of the mesethmoid bone and by the somewhat intermediate dentition of *Plethodectes*.

Another genus with the mouth and dentition of *Brycon* is *Chalcinus*, which differs chiefly in the keeled thorax and compressed abdomen; on this account Eigenmann associates it with *Gastropelecus*, but the skeleton is essentially similar to that of *Brycon*. *Pseudocorynopoma* differs rather markedly from *Chalcinus*, and appears to me more nearly related to *Astyanax*. In *Paragoniates* and *Leptagoniates* the keel of the thorax is evident, but the abdomen is not compressed to a sharp edge; these appear to me to be related to *Hemibrycon* and *Aphyocharax* respectively, whilst *Piabuca* may stand in the same relation to *Odontostilbe* that *Chalcinus* does to *Brycon*.

From the above remarks it will be evident that I do not regard Eigenmann's Gastropelecinæ and Agoniatinæ as natural groups, and the same may be said of his Characinæ, which includes three well-marked groups which are not specially related, viz. (1) *Bramocharax*, (2) *Salminus* and *Hystricodon*, and (3) *Charax*, *Roeboides*, and *Cynopotamus*.

*Bramocharax* is, in my opinion, closely related to *Scissor*; the latter is a *Tetragonopterus* with large mouth, produced snout, enlarged anterior teeth, and outer series of præmaxillary teeth reduced; *Bramocharax* seems to differ only in that the snout is longer, the enlarged anterior teeth are further apart, and the outer præmaxillary teeth are still smaller. *Salminus* and *Hystricodon* are closely related to *Brycon*, from which they differ only in the dentition; moreover, most of the teeth in *Salminus* are not truly conical, but approximate to the compressed and tricuspid type, especially in young specimens; *Agoniates* is known to me only from the description and figure of Müller and Troschel, but I believe that it will prove to be closely related to *Salminus*.

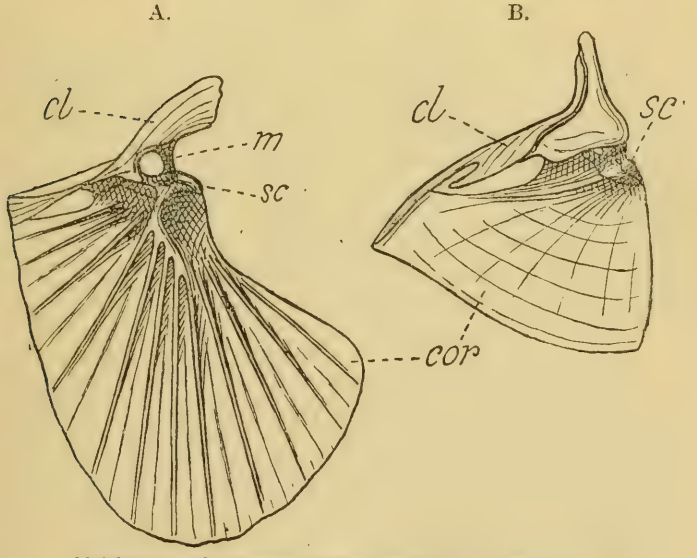
*Charax*, *Roeboides*, and *Cynopotamus*, with their exposed maxillary and long anal fin, show little resemblance to *Salminus*, but much to *Hemibrycon* and *Paragoniates*, to which they are probably rather closely related.

The African genus *Hydrocyon* has most of the characters of Characinæ such as *Alestes*, from which it differs especially in the structure of the mouth. The well-developed maxillary is firmly united by suture to the præmaxillary, and the latter is movably articulated with the ethmoid. The jaws are not much produced and the teeth are strong spaced canines ; the mouth can be widely opened, and by pulling down the lower jaw the upper can be readily made to move in a vertical plane until the edge forms an angle of 50° with its position when the mouth is closed *.

## Family 2. Gastropelecidæ.

The South-American genus *Gastropelecus* has usually been placed near *Chalcinus*, but I find that whilst the latter is

Fig. 1.




Cleithrum and primary pectoral arch (except radials) of A. *Gastropelecus pectorosus* and B. *Chalcinus trachypomus*.

*cl*, cleithrum ; *cor*, hypocoracoid ; *sc*, hypercoracoid (scapula) ; *m*, mesocoracoid.

extremely similar to *Brycon* in osteological characters, *Gastropelecus* is quite different. *Gastropelecus* is remarkable for its

* According to Boulenger (Cat. African Freshwater Fishes, i. p. 179) the præmaxillaries are "slightly movable vertically."

deep strongly compressed body, with the thorax and abdomen expanded into a sharp-edged semicircular disc; the pelvic fins are very small and the pectorals are long, with the rays very strongly branched, except the first, which is stout and simple. The pectoral arch is quite unique in structure; the hypocoracoids are ankylosed, forming a single bone, which is expanded below into a very large lamina that somewhat resembles a half-folded fan, the prominent radiating ridges of one side corresponding to the hollow grooves of the other; the radials are represented by a single short and broad bone, with a concavity fitting the broad convex articulating surface of the hypercoracoid.

In most other characters *Gastropelecus* is not unlike *Tetragonopterus*, except that there is no fontanel and rather prominent longitudinal ridges border the well-developed muciferous channels on the upper surface of the head.

### Family 3. Xiphostomatidæ.

Osteological characters of the Characidæ, but the small maxillary is firmly united by suture with the very long præmaxillary and the upper jaw is somewhat movable. The snout is produced and the mouth is large, with the teeth in the jaws small, uniserial; a band of minute teeth is present on the pterygoid; the scales are ciliated, the lateral line, when present, runs along the middle of the side, and the dorsal and anal fins are short, posterior.

South American; carnivorous, pike-like fishes.

*Xiphostoma, Luciocharax.*

### Family 4. Anostomidæ.

Upper jaw movable, the præmaxillaries articulating with a pair of antero-lateral sessile facets on the mesethmoid; maxillaries movably articulated with or adherent to the præmaxillaries. Teeth, when well developed, compressed incisors; palate toothless. Pterygoid rather broad posteriorly, overlapping the quadrate. Orbitosphenoid connecting alisphenoids and parasphenoid, nearly or entirely separated from the frontals. Dorsal fin median, short; scales cycloid or ciliated; lateral line straight.

These fishes are South American.

The genera may be arranged thus:—

1. Mouth small, non-protractile; lips thick. Præmaxillaries triangular; inner ends of maxillaries articulating with mesethmoid; rami of lower jaw short and stout. Quadrate firmly united to pterygoid and præoperculum (Pl. II. fig. 1); hyomandibular as in the Characidæ. (*Anostominæ.*)

A. Teeth well-developed in both jaws, uniserial, fixed incisors. *Anostomus, Rhytiodus, Leporinus, Leporellus.*

B. Teeth very small, movable, labial, uniserial in both jaws, or in the upper only ..... *Cænotropus.*

II. Mouth wide, non-protractile; lips thin or absent; jaws toothless. Præmaxillaries expanded transversely, carrying the small maxillaries away from the mesethmoid; rami of lower jaw moderately long, their transverse anterior portions slender. Suspensorium as in the Anostominæ. (*Curimatinæ.*).. *Curimatus, Anodus.*

III. Mouth terminal, somewhat protractile, with thick lips concealing the maxillaries; teeth minute, labial. Præmaxillaries curved; rami of lower jaw short, but formed as in the Curimatinæ. Quadrate movably articulated with the pterygoid in front and the præopercle behind; mesopterygoid and metapterygoid firmly united by suture, but only loosely attached to the pterygoid and hyomandibular respectively (Pl. II. fig. 2); hyomandibular with a single head, fitting into a groove formed by the sphenotic and pterotic. (*Prochilodontinæ.*) ..... *Prochilodus.*

## Family 5. Hemiodontidæ.

Præmaxillaries small, movably attached to the ethmoid; maxillaries well developed, articulated with or adherent to the præmaxillaries, their inner extremities articulating with the mesethmoid; mouth small, subterminal. Teeth uniserial, in both jaws or in the upper only; palate toothless. Pterygoid movably articulated with quadrate, narrowed posteriorly, ending in a small condyle; mesopterygoid firmly attached to pterygoid and loosely connected with quadrate (Pl. II. fig. 4). In other osteological characters essentially similar to the Characidæ. Dorsal fin short, median; anal short; scales cycloid; lateral line, when present, straight.

South American.

The principal genera may be arranged thus :—

I. Teeth fixed, conical or cuspidate, forming a single series in both jaws. Hyomandibular broad, two-headed. (*Nannostominæ.*) *Nannostomus, Characidium.*

II. Præmaxillaries with a single series of movable serrated incisors; lower jaw with a rather sharp transverse toothless edge anteriorly, with or without 2 or 3 small teeth laterally. Hyomandibular with a single head, fitting into a groove formed by the sphenotic and pterotic. (*Hemiodontinæ.*) .... *Hemiodon, Saccodon, Parodon.*

## Family 6. Citharinidæ.

Upper jaw movable, the præmaxillaries articulated with a pair of antero-lateral apophyses of the mesethmoid; maxillaries articulated with or attached to præmaxillaries, their inner ends not reaching the mesethmoid. Teeth in jaws

usually compressed, often cuspidate; palate toothless. Hyomandibular with a single head fitting into a groove; pterygoid normally attached to quadrate. Orbitosphenoid forming a long sutural union with frontals. Dorsal fin median, often rather elongate; scales usually ciliated; lateral line, when present, straight.

This very natural group of African fishes corresponds to the Ichthyoborinæ, Distichodontinæ, and Citharininæ of Boulenger, after excluding from the latter the American genera *Curimatus* and *Prochilodus*.

In the following arrangement of the genera important differences in the structure of the lower jaw are for the first time taken into account :—

I. Rami of lower jaw widely separated for the greater part of their length, anteriorly slender and curved together, movably connected at the symphysis; dentary and articulare firmly united *.

| | |
|---|---|
| Scales strongly ciliated; maxillary rather large, movably articulated with præmaxillary; upper jaw not or scarcely projecting beyond the lower; teeth small, bicuspid, in 2 or 3 series. (*Xenocharacinæ.*) | *Nannæthiops, Neolebias, Xenocharax.* |
| Scales strongly ciliated; maxillary united with præmaxillary; upper jaw strongly projecting, toothless anteriorly; teeth very small, bicuspid, uniserial. (*Hemistichodontinæ.*) | *Hemistichodus.* |
| Scales cycloid, or with the marginal teeth few and strong; maxillary small, adherent to præmaxillary; teeth minute, pointed or truncate, uniserial, on the labial margin. (*Citharininæ.*) | *Citharidium, Citharinus.* |

II. Dentaries more or less massive, firmly connected at the symphysis, movably articulated with the articulares.

A. Mouth small, subterminal or inferior; lower jaw short, with the rather massive dentaries merely coalescent; maxillary well developed, adherent to præmaxillary; teeth small, bicuspid, in 1 or 2 series. (*Distichodontinæ.*) *Distichodus, Nannocharax.*

B. Mouth terminal, rather large, the jaws produced; dentaries very massive, united by a long suture; præmaxillaries similar to the dentaries, with the reduced maxillaries united to them by suture. (*Ichthyoborinæ.*)

| | |
|---|---|
| No canines; teeth biserial, the outer strong, compressed, bi- or tricuspid; maxillary entering the gape | *Eugnathichthys, Paraphago, Phago.* |

* I find a well-developed angulare in *Citharinus*, as in other Characiformes.

Strong anterior canines; lateral teeth compressed, pointed, backwardly directed, uni- or bicuspid, uniserial, with or without minute inner teeth; præmaxillary decurved posteriorly, excluding the maxillary from the gape ..... *Ichthyoborus*, *Mesoborus*, *Neoborus*.

## Division 2. Gymnotiformes*.

These Neotropical fishes differ from the Characiformes externally in the short præcaudal region and anterior vent, long tapering tail, with the anal fin much extended and the caudal reduced or absent, absence of dorsal and pelvic fins, and restricted gill-openings. The mouth is non-protractile and the maxillaries enter the gape. In cranial osteology the Gymnotiformes closely resemble the Characidæ, but the opisthotic is absent; palatine and pterygoid bones are absent, but the other members of the hyopalatine series are well developed (Pl. II. fig. 3), and the mesopterygoid forms an extensive union with the parasphenoid and vomer. The suboperculum is reduced or absent. The post-temporal is simple; the coracoids show considerable differences in structure and development within the group. The vertebral column is similar to that of the Characiformes; the centra of the first four vertebræ remain distinct and the anterior ribs are inserted on autogenous parapophyses. The anterior and posterior divisions of the air-bladder are connected by a narrow duct †.

The principal characters of the families and subfamilies are shown in the following synopsis:—

I. Maxillaries well developed, larger than præmaxillaries. Hypocoracoid >-shaped, the slender lower fork running downwards and forwards to the cleithrum; pectoral radials 4. Anterior nostril superior; vent below the head; mouth usually small; dentition varied. Body scaly, compressed; no electric organs; orbitosphenoid and alisphenoids well developed.

A. Mesocoracoid well developed; lower limb of hypocoracoid meeting cleithrum near the symphysis; anterior part of air-bladder enclosed in a bony capsule; mouth toothless; maxillary articulated with distal end of præmaxillary; no caudal; no adipose fin ..... 1. *Rhamphichthyidæ*.

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* Eigenmann and Ward, Proc. Washington Acad. vii. 1905, p. 159, give a systematic account of the genera and species.

† Reinhardt, Arch. f. Naturg. 1854, p. 159.

B. No mesocoracoid; lower limb of hypocoracoid ending at edge of cleithrum far above the symphysis; air-bladder free; teeth, when present, small, pointed ..... 2. *Sternarchidæ*.

Maxillary with an apophysis articulating with a facet on head of vomer; caudal fin present; adipose fin represented by a long strip, lying in a groove on the back and attached anteriorly ..... 2 *a*. *Sternarchinæ*.

Maxillary not directly articulated with ethmoid or vomer; no caudal; no adipose fin ..... 2 *b*. *Sternopygināe*.

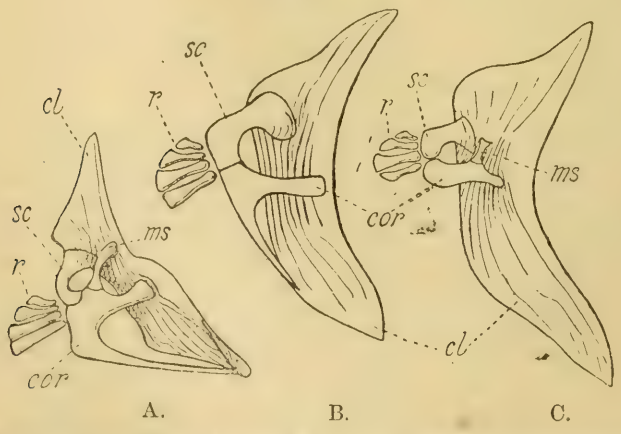
II. Maxillaries very small. Hypocoracoid a small lamina; mesocoracoid present, but very small; lowest pectoral radial shorter than the next. Anterior nostril labial; vent jugular; mouth moderate; teeth in jaws strong, uniserial; palate toothless. No caudal; no adipose fin.

A. Body scaly, compressed, moderately elongate; no electric organs; a small fontanel; orbitosphenoid and alisphenoids well developed, separating parasphenoid from frontals; 4 pectoral radials; vertebræ about 120..... 3. *Gymnotidæ*.

B. Body naked, not compressed, very elongate; large electric organs in the tail; no fontanel; orbitosphenoid and alisphenoids apparently suppressed, the parasphenoid extending upwards to the frontals; 7 or 8 pectoral radials; vertebræ about 250. 4. *Electrophoridæ*.

These Neotropical fishes have usually been placed in a single family, but I think that it will be readily admitted that the remarkable differences indicated above call for the recognition of at least four families.

Fig. 2.




Cleithrum and primary pectoral arch of A. *Rhamphichthys rostratus*, B. *Sternarchus albifrons*, and C. *Gymnotus carapo*.

*cl*, cleithrum; *sc*, hypercoracoid; *ms*, mesocoracoid; *cor*, hypocoracoid; *r*, radials.

### Family 1. Rhamphichthyidæ.

The genus *Rhamphichthys* includes fishes with a produced snout and toothless mouth, mental vent and anal fin originating below or in advance of the eyes. The pectoral arch is more primitive in structure than in any other fishes of the group. The small capsule which contains the anterior portion of the air-bladder has a median aperture posteriorly, and there is on each side an antero-superior opening which receives the end of the *tripus*. The vertebræ are numerous (more than 140 in *R. rostratus*); the skull is very similar to that of *Sternopygus*, with the fontanel very large.

### Family 2. Sternarchidæ.

The Sternarchinæ include the genera *Sternarchus*, *Sternarchogiton*, *Sternarchorhamphus*, and *Sternarchorhynchus*. In this subfamily the jaws are usually toothed, but the palate is toothless. I have examined the skeleton in *Sternarchus albifrons*, which has the skull smooth and rounded and the fontanel very small; the orbitosphenoid is paired, the two bones being separately united to the parasphenoid; the vertebræ number about 70.

I have satisfied myself by dissection that the pectoral arch is precisely similar in structure in *Sternarchus*, *Sternopygus*, and *Steatogenys*, differing from that of *Rhamphichthys* in the smaller size of the hypocoracoid and the absence of a mesocoracoid.

*Sternopygus* and *Steatogenys* agree together and differ from the Sternarchinæ in the absence of adipose and caudal fins and in the structure of the skull, the fontanel extending from supra-occipital to ethmoid, and of the mouth, a nodule of cartilage intervening between vomer and maxillary. In *Sternopygus* teeth are present in the jaws and on the mesopterygoids, in *Steatogenys* the mouth is toothless. These two genera, with the allied *Eigenmannia* and *Hypopomus*, constitute the subfamily Sternopyginæ. In *Sternopygus macrurus* there are more than 90 vertebræ.

### Family 3. Gymnotidæ.

This family includes but a single species, *Gymnotus carapo* (*Carapus fasciatus*), in most of its characters nearer to *Electrophorus* than to the members of the preceding group. The skull approaches that of *Electrophorus* in general form; especially noteworthy is the curving upwards of the edges of

the parasphenoid, the breadth of the ethmoid, no doubt correlated with the strength of the præmaxillaries, and the very small fontanel between the supra-occipital and parietals.

### Family 4. **Electrophoridæ***.

This family also contains only one species, the electric eel, *Electrophorus electricus* (*Gymnotus electricus*), differing from the preceding in the characters of specialization enumerated in the synopsis.

### Division 3. Cyprinifórmes.

Body deep or moderately elongate; dorsal and caudal fins well developed; pelvic fins usually present; no adipose fin. Mouth toothless, typically protractile. Opisthotic small or absent; posterior temporal fossa absent or variously developed, when present with a single posterior aperture. Lower pharyngeals typically falciform, not opposed to the toothless upper pharyngeals, but to paired posterior processes of the basioccipital, which may unite below the aorta. Hyopalatine and opercular bones all present; palatine movably articulated with mesopterygoid. Post-temporal simple.

Sagemehl (Morph. Jahrb. xvii. 1891, pp. 489–594, pls. xxviii. & xxix.) has given a detailed account of the cranial osteology of this group. The skeleton is very similar to that of the Characiformes, but there are some important differences.

In all the Cypriniformes the orbitosphenoid joins the alisphenoids behind, the lateral ethmoids in front, the frontals above, and the parasphenoid below. The palatine ends behind in a convex head which fits a concavity of the mesopterygoid; internally it articulates with the "septo-maxillaries," which are usually ossified and firmly united to the vomer, appearing as antero-lateral apophyses of that bone, but may remain as cartilages intervening between the vomer and palatine. The "septo-maxillary" and palatine articulate anteriorly with the maxillary, either directly or through the intervention of one or two pairs of "submaxillary" or "pre-palatine" cartilages (Catostomidæ) or bones (Cobitidæ, Homalopteridæ), which are more or less reduced in the Cyprinidæ.

The præmaxillaries have ascending pedicels which are attached to the extremity of a movable "rostral" bone; this is articulated with the vomer and is vertical when the

* On the electric organ, see Sachs, 'Untersuchungen am Zitteraal,' 1881.

præmaxillaries are retracted, horizontal when they are protruded.

The Cypriniformes correspond to the family Cyprinidæ of Günther, who, in 1868 (Cat. Fish. vii.), recognized four principal divisions, which have been accepted by all subsequent authors. These groups have sometimes been regarded as subfamilies, sometimes as separate families — Catostomidæ, Cyprinidæ, Cobitidæ, and Homalopteridæ.

### Family 1. Catostomidæ.

Præmaxillaries small and maxillaries entering the gape; lips usually fleshy; no barbels. Pharyngeal teeth uniserial, often numerous; pharyngeal processes of basioccipital uniting below the dorsal aorta to form an expanded perforated lamella, rolled up at the edges, ending in a short blunt process, and not covered with a horny sheath. Mesethmoid broad, firmly united with frontals; subtemporal fossæ shallow; a large lateral occipital foramen on each side of the *foramen magnum*; paired fossæ present in the temporal region, open above and closed behind, but no posterior temporal fossæ. Cleithra normally suspended from supra-cleithra, much expanded transversely. Air-bladder large, free, divided into two or three parts by transverse constrictions. Outer ramus of *os suspensorium* strong, downwardly directed, with a transverse laminar expansion which meets its fellow; transverse process of second vertebra with a laminar expansion directed downwards and backwards, united by suture with the lamina of the *os suspensorium*.

Principal genera: *Carpiodes*, *Cycleptus*, *Catostomus*, *Xyrauchen*, *Moxostoma*, &c., with about sixty species from North America. *Myxocyprinus*, with two species from China, is related to *Carpiodes*.

### Family 2. Cyprinidæ.

Præmaxillaries excluding maxillaries from gape; one or two pairs of barbels or none. Pharyngeal teeth, when present, in one, two, or three series, not more than seven in one series; pharyngeal processes of basioccipital typically united below the aorta to form a horizontal or oblique plate, flattish or concave below, supporting a horny pad *, and produced backwards into a strong process for the attachment of the *retractor* muscles of the lower pharyngeals. Mesethmoid broad, firmly

* On the structure of this horny pad, see Gratzianow, Zool. Anz. xxiii. 1900, p. 66.

united with frontals; subtemporal fossæ very deep; no temporal depressions, but supra-temporal fossæ more or less distinct, open behind, roofed by the post-temporal and sometimes by the pterotic and parietal. Cleithra normally suspended from supra-cleithra. Air-bladder divided into two parts by a constriction, typically large and free, but sometimes reduced (*Discognathus*, *Gyrinochilus*), or the anterior part sometimes enclosed in a bony capsule formed by the *ossa suspensoria* (*Rhinogobio*, *Saurogobio*). Outer ramus of *os suspensorium* not connected with its fellow nor with the transverse process of second vertebra.

A fontanel is usually absent, but in *Saurogobio* it extends from the supra-occipital to the ethmoid, except for the frontal bridge. The capsule enclosing the anterior part of the air-bladder in *Rhinogobio* is quite remote from the transverse processes of the second vertebra and is widely open behind. In *Saurogobio* the posterior aperture is reduced and there are lateral expansions with terminal orifices which bear some resemblance to those of the Cobitidæ; in this case, however, the transverse processes of the second vertebra are free except near their base, where they support the lateral expansions, and the cavities of the latter do not communicate with that of the capsule and apparently contain diverticula of the paravertebral sacs.

There are probably at least 1000 species known from North America, Eurasia, and Africa.

A satisfactory classification of the genera cannot be arrived at without monographing the family, but the following remarks may not be out of place.

The greatest variety of genera and species is found in Asia, which may be regarded as the original home of the group; and of all the genera which I have examined *Opsariichthys* seems to be the most primitive. The terminal mouth, wide gill-openings, large pseudobranchiæ, median dorsal fin, rounded abdomen, triserial pharyngeal teeth, complete series of circumorbitals, large posterior temporal fossæ, and separate second and third vertebræ are all features of generalization. The foramen between quadrate and metapterygoid, so characteristic of the Characiformes, is well developed in *Opsariichthys*; this foramen is also present in *Chela*, but is absent in all other Cyprinids. In *Opsariichthys* the cleithra are formed much as in typical Characiformes, narrowing forwards to a point; many other genera with strongly decurved lateral line—*Barilius*, *Danio*, &c.—agree with *Opsariichthys* in the form of the cleithra, rounded or pointed anteriorly, and these are connected by genera such as *Aspius* with *Leuciscus*

and its allies, in which the cleithra are more expanded and truncated anteriorly; all the American genera seem to be Leuciscines, and *Alburnus* and *Abramis* also pertain to this group, to which *Rhodeus* is nearly related; the *Barbus* group differs in that the cleithra are distinctly emarginate anteriorly.

These characters are not sufficiently well marked for the definition of subfamilies, and others, such as the pharyngeal dentition, the form of the pharyngeal process, &c., are of use only in defining genera or small groups of genera.

Günther's Cyprinina seems to be a natural group, after excluding the North-American genera, but to it should be added *Rohteichthys* and *Osteobrama*, with the osteological characters of *Barbus*, and doubtless *Leptobarbus* and *Mystacoleucus* also; *Tinca* seems to be nearer to *Barbus* than to *Leuciscus*. The Rasborina and Danionina should be united and some of the Abramidina should be added to this group, some to the Leuciscina. *Xenocypris* is a Leuciscine, and the aberrant *Semiplotus* is, perhaps, nearest to it. *Hypophthalmichthys* is nearly related to the *Barilius* group.

Thanks to the kindness of Mlle. Dr. C. L. Popta, I have been able to examine a specimen of the remarkable Bornean Cyprinid, *Gyrinochilus pustulosus*, Vaill. This fish is evidently closely related to *Discognathus*, which it resembles in form, scaling, structure, and position of the fins, structure of the air-bladder, inferior mouth with the united lips expanded and papillose, and even in the groove on the snout and the disposition of the tubercles on the head. *Gyrinochilus* differs externally from *Discognathus* especially in the much broader lips, folded when retracted and when expanded recalling the suctorial disc of *Petromyzon*, and in the structure of the gill-opening, the upper part of which forms an inhalent orifice, the opercular membrane being curved inwards in front of the pectoral arch in this region. As described and figured by Vaillant, each branchial arch has a double series of gill-rakers developed along the upper edge of the gill, filtering the inhalent current of water. Internally *Gyrinochilus* is remarkable chiefly for the very long and much convoluted intestine, the slender toothless lower pharyngeals, the absence of a horny pad, and the reduction of the pharyngeal processes of the basioccipital to a pair of short blunt projections, much as in some Cobitidæ and Homalopteridæ.

Extraordinarily aberrant as *Gyrinochilus* is, its place in the system seems to be in the family Cyprinidæ next to *Crossochilus* and *Discognathus*; to make it the type of a

separate family or subfamily would merely obscure its relationships *.

Some of the more typical genera are grouped in the following list :—*Opsariichthys, Chela*; *Barilius, Bola, Aspidoparia, Danio, Nematabramis, Rasbora, Luciosoma, Nuria, Amblypharyngodon, Aspius, Scombrocypris, Chanodichthys, Pelecus, Culter*; *Hypophthalmichthys*; *Leuciscus, Squaliobarbus, Xenocypris, Ctenopharyngodon, Chondrostoma, Orthodon, Campostoma, Hybognathus, Cochlognathus, Hybopsis, Exoglossum*; *Alburnus, Abramis*; *Semiplotus*; *Rhodeus, Acanthorhodeus, Achilognathus*; *Cyprinus, Carassius, Barbus, Cosmochilus, Leptobarbus, Rohteichthys, Osteobrama, Varicorhinus, Gymnostomus, Psilorhynchus, Scaphiodon, Thynnichthys, Albulichthys, Labeo, Barbichthys, Dangila, Cirrhina, Osteochilus, Catla, Crossochilus, Discognathus, Gyrinochilus, Tinca, Aulopyge, Rhynchocypris, Pseudorasbora*; *Luciobrama*; *Oreinus, Schizothorax, Diptychus, Gymnocypris, Ptychobarbus, Schizopygopsis*; *Hemibarbus, Acanthogobio, Gobio, Pseudogobio, Leucogobio, Rhinogobio, Saurogobio.*

## Family 3. Cobitidæ.

Præmaxillaries excluding maxillaries from gape; three pairs of barbels or more. Pharyngeal teeth uniserial, often rather numerous, on the inner and posterior edges of subtriangular laminar expansions of the pharyngeal bones, which are scarcely falciform; pharyngeal processes of basioccipital sometimes very small, sometimes larger and meeting below the aorta, but never united and not supporting a horny pad. Subtemporal fossæ shallow; a lateral occipital foramen on each side of the *foramen magnum*. Præorbital and suborbitals unossified. Cleithra normally suspended from supracleithra. Posterior part of air-bladder small or vestigial; anterior part enclosed in a bony capsule, produced outwards on each side into an expansion with terminal orifice, connected by a duct with the skin above the pectoral fin; anterior wall of lateral expansion of air-bladder capsule formed by the transverse process of the second vertebra.

The numerous species of this family are chiefly inhabitants of mountain streams in tropical and temperate Asia. Three species are European and one is found in Abyssinia.

* Since writing the above I note that Mlle. Popta (Notes Leyden Mus. xxvii. 1906, p. 122) has described from Borneo *Paracrossochilus bicornis*, a fish in many ways nearer to *Gyrinochilus* than either *Crossochilus* or *Discognathus*, the lips folding in a similar manner when the mouth is shut.

The principal genera may be arranged thus * :—

I. Mesethmoid firmly united to frontals; skull depressed; anterior part of air-bladder nearly divided into two, the lateral halves of the capsule connected only by a narrow bridge; no spine; barbels 6 or 8. (*Nemachilinæ.*)..... *Nemachilus, Diplophysa, Oreonectes, Lefua.*

II. Mesethmoid movably articulated with frontals; skull compressed; air-bladder undivided, the central portion of the capsule subspherical. (*Cobitidinæ.*)

A. No spine; 10 or 12 barbels; parapophyses ankylosed with centra. *Misgurnus.*

B. Lateral ethmoid a movable spine; 6 or 8 barbels; parapophyses distinct from centra ..... *Botia, Parabotia, Leptobotia, Acanthopsis, Cobitis, Lepidocephalichthys, Jerdonia, Acanthophthalmus, Lepidocephalus, Eucirrichthys, Apua.*

## Family 4. **Homalopteridæ.**

Præmaxillaries excluding maxillaries from gape; three pairs of barbels or more. Pharyngeal teeth uniserial, often rather numerous; lower pharyngeals falciform; pharyngeal processes of basioccipital very small or absent; no horny pharyngeal pad. Skull depressed; mesethmoid broad, firmly united to frontals; subtemporal fossæ deep; lateral occipital foramina absent. Suborbitals ossified and præorbital large, extending forward to the end of the snout, supported by an anterior process of the lateral ethmoid. Cleithra directly attached to epiotics, expanded below to form horizontal laminæ. Air-bladder reduced, completely divided into two lateral portions, each enclosed in a capsule formed by the *os suspensorium* and the transverse process of the second vertebra; each capsule with a lateral orifice beneath the skin and with an extended facet for articulation with the cleithrum.

This well-marked family includes a number of species from Southern Asia, which are readily distinguished by the numerous barbels, the subterminal or inferior mouth, the flattish lower surface, and the horizontal paired fins with the anterior rays simple, graduated.

Genera: *Homaloptera, Lepturichthys* †, *Helgia, Balitora,*

* *Cf.* Vaillant, Notes Leyden Mus. xxiv. 1902, p. 133, for a synopsis of the genera.

† *Lepturichthys*, gen. nov., type *Homaloptera fimbriatum*, Günth., differs from *Homaloptera* in the long slender tail, with a dorsal and ventral series of plates, which are probably expansions of the neural and hæmal spines.

*Octonema, Glaniopsis, Parahomaloptera, Crossostoma, Hemimyzon* *, *Gastromyzon* (*cf.* Vaillant, Notes Leyden Mus. xxiv. 1902, p. 110).

EXPLANATION OF PLATE II.

*Fig.* 1. Hyopalatine and opercular bones of *Leporinus frederici.*
*Fig.* 2. Ditto of *Prochilodus lineatus.*
*Fig.* 3. Ditto of *Sternopygus macrurus.*
*Fig.* 4. Ditto of *Hemiodus kappleri.*

*p*, frontal process of mesopterygoid; *pal*, palatine; *pt*, pterygoid; *q*, quadrate; *ms*, mesopterygoid; *mt*, metapterygoid; *hy*, hyomandibular; *sy*, symplectic; *pop*, præoperculum; *op*, operculum; *sop*, suboperculum; *iop*, interoperculum.

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## III.—*Some Records of Collembola new to England, with Description of a new Species of* Oncopodura.

By John W. Shoebotham, N.D.A.

(From the Cooper Laboratory for Economic Research, Watford, Herts.)

[Plate III.]

During the last two and a half years the author has made collections of Collembola from several districts in England, but chiefly from the counties of Hertfordshire, Buckinghamshire, and Staffordshire. A list of the Hertfordshire Collembola was published last year †, since when additional forms have been found. Several species have been found which prove to be new to the English fauna, including a hitherto undescribed form. These records, with references to the original descriptions of the species, are given in the following paper.

Order COLLEMBOLA, Lubb.

Suborder Arthropleona, Börn.

Family **Achorutidæ**, Börn.

Subfamily *Achorutinæ*, Börn.

Genus Achorutes, Templ., Lubb.

1. *Achorutes serratus*, Ågr.

*Achorutes serratus*, Ågren, (1904) pp. 5, 6, pl. i. figs. 5–7.

*Loc.* Staffordshire.

Identification confirmed by Dr. Ågren.

* *Hemimyzon*, gen. nov., type *Homaloptera formosanum*, Bouleng., pelvic fins 15- or 16-rayed, with extended bases convergent posteriorly, approximating to the *Gastromyzon* structure.

† Collinge, W. E., and Shoebotham, J. W., "The Apterygota of Hertfordshire," Journ. Econ. Biol. vol. v. pt. 3, pp. 95–132, figs. 1–15 (1910).

2. *Achorutes schäfferi*, Carl *.

*Achorutes affinis*, Schäffer, (1900) p. 250.
*Achorutes schäfferi*, Carl, (1901) p. 253.

*Loc.* Hertfordshire.

Genus Willemia, Börn.

*Willemia*, Börner, (1901 *b*), pp. 428, 429.

3. *Willemia anophthalma*, Börn.

*Willemia anophthalma*, Börner, (1901 *b*) pp. 429, 430, figs. 6–8.

*Loc.* Buckinghamshire.

Subfamily *Onychiurinæ*, Börn.

Genus Onychiurus, Gerv., Börn.

4. *Onychiurus affinis*, Ågr.

*Onychiurus affinis*, Ågren, (1903) p. 128.

*Loc.* Buckinghamshire.

5. *Onychiurus furciferus* (Börn.).

*Aphorura furcifera*, Börner, (1901 *a*) pp. 3, 4.

*Loc.* Buckinghamshire and Staffordshire.

Subfamily *Neanurinæ*, Börn.

Genus Pseudachorutes, Tullb.

6. *Pseudachorutes corticicolus* (Schäff.).

*Schöttella corticicola*, Schäffer, (1896) p. 176, figs. 34, 62.

*Loc.* Staffordshire.

Genus Micranurida, Börn.

*Micranurida*, Börner, (1901 *c*) p. 702.

7. *Micranurida pygmæa*, Börn.

*Micranurida pygmæa*, Börner, (1901 *c*) pp. 702, 703, figs. 6, 7.

*Loc.* Buckinghamshire.

* The specific name *affinis* had been previously used by Lucas for a species of *Achorutes* from Algeria.

Family **Entomobryidæ**, D. T.

Subfamily *Entomobryinæ*, Schäff., Börn.

Genus Isotoma, Bourl., Börn.

8. *Isotoma violacea*, Tullb.

*Isotoma violacea*, Tullberg, (1876) p. 36.

*Loc.* Buckinghamshire.

Genus Proisotoma, Börn.

9. *Proisotoma minima* (Absln.).

*Isotoma minima*, Absolon, (1901) pp. 32, 33.

*Loc.* Buckinghamshire.

Genus Isotomodes, (Axelson-) Linnaniemi *.

*Isotomodes*, (Axelson-) Linnaniemi, (1907) p. 129. (Name only, not described.)

10. *Isotomodes productus* (Axels.).

*Isotoma elongata*, Axelson, (1903) p. 6.
*Isotoma producta* †, Axelson, (1906).

*Loc.* Staffordshire.

Subfamily *Oncopodurinæ*, Carl und Lebed.

*Oncopodurinæ*, Carl und Lebedinsky, (1905) p. 565.

Genus Oncopodura, Carl und Lebed.

*Oncopodura*, Carl und Lebedinsky, (1905) p. 564.

The following generic description is mainly after Carl and Lebedinsky, with a few modifications :—

Antennæ short, 4-segmented, the last segment with sense-bristles. Ant. iii. and iv. not ringed. Postantennal organ externally present or absent. Eyes absent. Prothorax rudimentary, not seen from above. Mesothorax large, not produced over the head, rounded in front. Abdomen iii. and iv. subequal. Furcula strongly developed. Dentes 1-segmented,

* Axelson, in 1906, assumed the name Linnaniemi, but, to avoid confusion between his earlier and more recent publications, he suggests that both names should appear in reference to his works published since 1906.

† The specific name *elongata* having been used by MacGillivray (1896), Axelson renamed the species *producta* in 1906.

not ringed, with chitin hooks, ventrally with scales. Mucro very long, similar to that of the *Tomocerinæ*, but without basal teeth. Upper claw simple. A clavate hair present on the tibio-tarsus of the second pair of legs, situated about the middle of its length, absent on legs i. and iii. Scales present.

The genus *Oncopodura* was erected in 1905 for a species (*O. hamata*) found in the Sundurlu Cave in the Crimea, in Southern Russia. It was placed in a separate subfamily (Oncopodurinæ), and this arrangement was used in the systematic works of Wahlgren (1906) and Börner (1906). Except for the original paper, the author has not seen any other records of *Oncopodura*, and Dr. Carl informed him (*in lit.* Nov. 1910) that he did not know of any other published records.

### 11. *Oncopodura crassicornis*, sp. n. (Pl. III.)

Antennæ short and thick, 4-jointed, slightly shorter than the head-diagonal (as 55 : 62). Ant. i. : ii. : iii. : iv. = 8 : 11 : 15 : 21. All segments covered with short hairs. Ant. iv. with four smelling-hairs placed in a row, without retractile sense-knob. Ant. iii. and iv. not ringed; ii. with one smelling-hair at the distal end; i. broader than long. Antennal organ iii. made up of two stout sense-staffs.

Eyes absent. Postantennal organ present, difficult to see, made up of six smooth somewhat triangular tubercles arranged in a ring (as in *Anurida maritima*), situated lateral and slightly posterior to the base of the antenna.

Thorax i. small, not seen from above. Thorax ii. well developed, rounded in front, but not produced over the head, with a fine sensory hair on each side, over the base of legs ii. (Such hairs are apparently absent from the abdomen.)

Tibio-tarsus of leg ii. with an outstanding clavate hair, situated about the middle of its length, expanded spoon-like at its end. Legs i. and iii. without this hair.

Claw short, without inner or lateral teeth or pseudonychia. Empodial appendage lanceolate, without teeth, more than half as long as the claw-diagonal (as 5 : 9). Prætarsal hairs long, only slightly shorter than the empodial appendage.

Abdomen iii. slightly longer than iv. Ventral tube short, not clavate. A ventral abdominal groove is present for the reception of the furcula. Tenaculum with four retaining teeth.

Furcula long. Manubrium ventrally with scales, dorsally with some simple and feathery hairs. Manubrium : dens : mucro = 38 : 24 : 23 (measured ventrally).

Dens 1-segmented, thick at the base, but suddenly diminished in size at about $\frac{2}{5}$ from the proximal end, with several chitin hooks and spines, as follows :—two large hooks at the distal end, inner and outer, both of which overreach the base of the mucro; three smaller, less curved hooks, situated about equal distances apart, on the inner side ; one straight spine on the outer side $\frac{2}{5}$ from the proximal end. Dens ventrally with numerous scales, dorsally with several long feathery hairs. A feathery hair of uniform thickness arises at the base on a small tubercle, and a simple short hair is present on the outer side towards the distal end.

Mucro long and slender, with four teeth—apical, anteapical, and two dorsal. The relative distances of the teeth from the base are as follows :—17 : 26 : 35 : 39. The proximal dorsal tooth is stout, blunt, and directed towards the proximal end. The mucro is provided with a thin transparent lamella * or "mucronal sheath" which almost encloses it from the base to the second tooth, and a narrow pointed lamella is continued from the outer side beyond the apex of the mucro.

Body-form short and broad. The relative lengths of the body-segments as follows :—

| | | Th. | | Abd. | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Ant. | Head-diag. | ii. | iii. | i. | ii. | iii. | iv. | v. | vi. |
| 55 | 62 | 46 | 33 | 24 | 28 | 34 | 30 | 15 | 12 |

Hair-covering short and scanty, but the head and body are thickly covered with broad rounded scales.

Colour white.

Length ·6 mm.

*Loc.* Berkhamsted, Hertfordshire ; under stones.

*Habits.* This species was found under stones amongst decaying leaves in a garden at the end of October 1910, and under stones embedded in soil at a place about $\frac{1}{2}$ mile from the first locality in November and December. A single specimen was obtained at the end of February 1911.

They were only found when the ground was moist, and were not very active unless the light was strong, but when the sun was shining on them they quickly jumped away. Specimens were taken in December immediately after a sharp frost.

* These lamellæ are not firmly attached to the mucro proper, as in some of the mucrones they had become detached.

The two species of *Oncopodura* may be distinguished by the following characters :—

*O. hamata*, Carl and Lebed.*

Antennæ slender, segments as 1 : 2 : 3½ : 4.

Postantennal organ absent (at any rate externally).

Claw with lateral lamella.

Proximal tooth of the mucro slender, pointed, directed towards the distal end.

Manubrium : dens : mucro = 26 : 13 : 17.

Abdomen iv. a little longer than iii.

Relative lengths of teeth on mucro from base = 17 : 34 : 45 : 47.

Colour yellowish white.

Length 1·6–1·8 mm.

*O. crassicornis*, sp. n.

Antennæ thick, segments as 8 : 11 : 15 : 21.

Postantennal organ present, of six tubercles.

Claw without lateral lamella.

Proximal tooth of the mucro stout, blunt, directed towards the proximal end.

Manubrium : dens : mucro = 38 : 24 : 23.

Abdomen iv. a little shorter than iii.

Relative lengths of teeth on mucro from base = 17 : 26 : 35 : 39.

Colour white.

Length ·6 mm.

## Suborder Symphypleona, Börn.

### Family Neelidæ, Fols.

### Genus Neelus, Fols.

#### 12. *Neelus minutus*, Fols.

*Neelus minutus*, Folsom, (1901) pp. 221, 222, pl. ii. figs. 3–11.

*Loc.* Hertfordshire.

### Family Sminthuridæ, Lubb.

### Subfamily *Sminthurinæ*, Börn.

### Genus Sphyrotheca, Börn.

*Sphyrotheca*, Börner, (1906) p. 183.

#### 13. *Sphyrotheca lubbocki* (Tullb.).

*Sminthurus lubbocki*, Tullberg, (1872) p. 33.

*Loc.* Staffordshire.

Except for *S. lubbocki*, all the species here recorded are new to the British Isles. A single example of *S. lubbocki* was recorded by Bagnall (1909) from the Kyles of Bute, Scotland.

* The characters here specified are taken from the description and figures given by Carl and Lebedinsky (1905).

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## EXPLANATION OF PLATE III.

All the illustrations are of *Oncopodura crassicornis*, sp. n.

*Fig.* 1. Outline, from the side.
*Fig.* 2. Right antenna from above, showing also postantennal organ from the side.
*Fig.* 3. Three terminal joints of the antenna, showing sense-organs.
*Fig.* 4. Left postantennal organ and base of antenna.
*Fig.* 5. Mesothorax from the side, showing fine sensory hair.
*Fig.* 6. Manubrium and dentes from the side. (Nearly all the feathery hairs had been denuded from the dentes.)
*Fig.* 7. Mucro, with lamellæ, from the side.
*Fig.* 8. Tibio-tarsus and foot of second leg, showing clavate hair.
*Fig.* 9. Outline of scale.

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## IV.—*Notes on the* Forficularia.—XVIII. *More new Species.*

By Malcolm Burr, D.Sc., F.E.S., F.Z.S., F.G.S.

### *Diplatys riggenbachi*, sp. n.

♂. Vertex tumidus; occiput depressum, carinulis acutis; pronotum ♂ ♀ breve, pentagonale, postice subangustatum; elytra alæque perfecta; segmentum ultimum dorsale ♂ inflatum; segmentum penultimum ventrale ♂ basi latum, apicem versus angustatum, apice truncatum; forcipis bracchia ♂ basi dilatata ac deplanata, tum attenuata, fortiter arcuata.

| | ♂. | ♀. |
|---|---|---|
| Long. corporis ..... | 13 mm. | 10·5–12·5 mm. |
| „ forcipis ..... | 2 „ | 2 „ |

Size relatively large; general colour rust-red.

Antennæ fulvous, with about 22 segments, third not very long, fourth and fifth quite short, rest slowly lengthening; cylindrical.

Head broad and depressed; sutures distinct; in the ♂ vertex tumid, occiput depressed, postocular keels sharp; in the ♀ vertex and occiput similar, postocular keels shorter; eyes prominent.

Pronotum ♂ ♀ small, subpentagonal, gently narrowed posteriorly; prozona ample, tumid; metazona narrow, depressed; orange-red.

Elytra ample, pubescent; dull black, with a long discoidal fulvous spot in anterior portion.

Wing-scales hairy, long, brown or blackish.

Legs fulvous.

Abdomen red-brown, pubescent.

Last dorsal segment ♂ inflated, broader than preceding, subquadrate, smooth, pubescent, with a median suture; with a pair of short, diverging, folded crests running over the insertion of the forceps, terminating in a convexity of the posterior margin, which is gently concave between these points. In ♀ simple, narrower, posterior margin gently produced over insertion of the forceps.

Penultimate ventral segment ♂ broad at the base and strongly narrowed apically, truncate at the apex itself; in the ♀ narrow, rounded at the apex.

Forceps with the branches in the ♂ strongly depressed and dilated in the basal third, this dilated portion denticulate on its margin and ending abruptly in a blunt tooth; beyond this point attenuate and strongly bowed; the points meeting: in the ♀ simple, contiguous, almost straight, hooked at the apex.

West Africa: Cameroon, Garna, 12–19. iv. 09, 2 ♂, 5 ♀ (*Riggenbach*, S. G.; in Mus. Berlin).

Type in Berlin Museum.

This species somewhat resembles *D. macrocephalus*, *D. gladiator*, and *D. falcatus*. It differs in the characteristic form of the penultimate ventral segment of the male, also in the keels on the last dorsal segment, and the form of the forceps, though similar, is not quite the same.

### *Anisolabis owenii*, sp. n.

Atra, pedibus fulvis; statura mediocri, sat gracili; corpus dense punctulatum; abdomen segmentis lateribus 6–9 acutis, paullo rugulosis, 6–8 carinulatis; segmentum ultimum dorsale ♂ magnum, utrinque tumido-inflatum; segmentum penultimum ventrale ♂ obtusangulum; forcipis bracchia ♂ subcontigua, apice arcuata.

| | ♂. |
|---|---|
| Long. corporis ..... | 17·5 mm. |
| „ forcipis ..... | 3 „ |

Build not very robust; size medium; colour black.

Antennæ with 17 segments, 1–2 orange, the rest grey-brown; third rather short, fourth and fifth subglobular, the rest lengthening, subcylindrical.

Head tumid, black, feebly punctulate; eyes prominent.

Pronotum black, anterior margin and sides straight, posterior margin very gently convex; median suture distinct, feebly punctulate.

Meso- and metanotum black, more densely punctulate.

Sternum typical, orange.

Legs orange; tarsi long, first and third segments about equal.

Abdomen black, densely and rather coarsely punctulate; sides of sixth to ninth segments acute and rugulose, sixth to eighth carinulate.

Last dorsal segment ♂ ample, smooth, with distinct median suture, truncate posteriorly, inflated at each side above into an incipient blunt tubercle or crest.

Penultimate ventral segment broad, obtusangular, the apex sharply pointed.

Pygidium narrow.

Forceps with the branches subcontiguous, stout, trigonal at the base, straight in basal half, apically attenuate and incurved, feebly asymmetrical.

West Africa: Liberia (*S. G. Owen*, 1 ♂, in c. m.).

This species is only known from the unique type in my collection, taken by Mr. S. G. Owen, A.R.S.M., in Liberia. It is well characterized by the shape of the penultimate ventral segment. It resembles *A. infelix*, Burr, but differs among other points in the less strongly pitted abdomen and feebly punctulate thorax and head.

It also resembles *A. turgida*.

It differs from *A. rufescens*, Kirby, in the feebly punctulate and black head and thorax and angular penultimate ventral segment.

### *Anisolabis turgida*, sp. n.

Rufo-castanea et nigra; caput et thorax lævia; abdomen minute punctulatum; ♂ segmentis 5–9 lateribus acutis, rugulosis, obsolete carinulatis; segmentum ultimum dorsale ♂ magnum, sublæve, superne utrinque crista tumida instructum; forcipis bracchia ♂ remota, arcuata.

| | ♂. | ♀. |
|---|---|---|
| Long. corporis ..... | 15 mm. | 14 mm. |
| „ forcipis ..... | 2·5 „ | 2 „ |

Build stout; size medium; general colour dark reddish chestnut to black.

Antennæ with 15 segments, uniform yellowish brown, rather long and rather thick.

Head deep red, smooth, sutures not very distinct.

Pronotum a little longer than broad, very slightly convex anteriorly and posteriorly, sides straight; almost parallel, very slightly diverging posteriorly; smooth, dark reddish brown, median suture distinct.

Meso- and metanota and first three abdominal segments smooth, black.

Sternal plates yellowish, typical.

Legs yellow; tarsi long, first and third segments about equal.

Abdomen feebly dilated, black, very finely punctulate; sides of fifth to ninth segments in the ♂ acute (fifth rather feebly so), rugulose, and feebly carinulate.

Last dorsal segment ♂ ample, jet-black, nearly smooth, with distinct median suture; transverse, rectangular, narrower than the preceding; on each side above there is a low, rather tumid, compressed crest, running into the elevation over the insertion of the forceps; in the ♀ narrower, sloping, with no crest.

Penultimate ventral segment ♂ broadly rounded, punctulate.

Forceps with the branches in the ♂ remote, stout, trigonal at base, attenuate, cylindrical, and arcuate in apical half; inner margin finely denticulate: in ♀ contiguous, straight.

West Africa: Cameroon (1 ♀, c. m.); Gendero, 2nd March, 1909 (*Riggenbach*, S. G., 1 ♂, type, in Mus. Berlin).

This species is distinguished by the nearly smooth body, with fine and weak punctulation, and by the crests of the last dorsal segment of the male.

### *Anisolabis vicina*, sp. n.

*A. kristenseni* vicina; differt statura minore, debiliori, pronoto rufo, abdomine rufescenti, forcipe ♂ minus abrupte arcuato, margine interno toto crenulato, abdomine dorso punctulato, forcipis bracchiis ♀ contiguis, rectis.

| | ♂. | ♀. |
|---|---|---|
| Long. corporis .... | 18·5–19·5 mm. | 15 –17 mm. |
| „ forcipis..... | 3– 3·5 „ | 2·5–3 „ |

Size medium; general colour deep reddish black; head and thorax yellowish.

Antennæ yellowish brown to blackish, basal segments often paler; third segment rather short.

Head smooth, sutures distinct, deep red, shaded with black.

Pronotum smooth, bright orange-yellow anteriorly, nearly black posteriorly; slightly broader than long, and slightly widened posteriorly, all sides straight.

Meso- and metanota smooth, black.

Sternum orange-yellow, the plates as in *A. kristenseni*.

Legs orange-yellow.

Abdomen moderately dilated, almost black, but with a distinct red tinge; sides of fifth to ninth segments in ♂ acute and rugulose.

Last dorsal segment ♂ transverse, rectangular, nearly smooth, with a median depression.

Penultimate ventral segment ♂ broadly rounded, the apex truncate; in ♀ obtusangular.

Parameres narrow.

Forceps with the branches in the ♂ remote, stout, trigonal in basal half, gradually attenuate apically, asymmetrically but gradually arcuate, the inner margin finely denticulate; in the ♀ contiguous, straight, denticulate on the inner margin.

Abyssinia: Harrar and River Errer, 9 ♂, 6 ♀ (*Staudinger and Kristensen*, c. m. and Coll. Petersen); Gara Mulata, 1 ♂, 1 ♀ (*Erlanger and Neumann*, in Mus. Berlin).

This species is closely related to *A. felix* and *A. kristenseni*; from the former it differs in the absence of the rectangular dilatation of the right branch of the forceps in the male and also in the yellow pronotum.

From *A. kristenseni* it differs in its smaller size, weaker build, and in coloration; in that species the abdomen is jet-black above, in this it is a very deep red-black, the red tinge being quite distinct; the head usually has an indistinct black patch above, and the pronotum is clear orange-yellow in the anterior portion.

The sculpture of the abdomen is different, being a fine punctulation in this species. The forceps are much less abruptly attenuate and more regularly arcuate; in the female the branches are contiguous and straight.

It answers well to the description of *Gelotolabis burri*, Zacher, from north-eastern Africa, but the apical segment of the parameres is much narrower and less pointed apically than appears to be the case in that species, judging from Zacher's figure.

*Anisolabis æthiopica*, sp. n.

Statura magna; colore atro, femoribus fulvis, nigro-geniculatis, tibiis fuscis; abdomen segmentis 5–9 acutis, rugulosis; forcipis bracchia ♂ prope basin sat dilatata, fortiter arcuata, asymmetrica; parameres breves, dilatati.

| | ♂. | ♀. |
|---|---|---|
| Long. corporis .... | 23·5–26 mm. | 20 –26·5 mm. |
| „ forcipis .... | 4·5–5 „ | 4·5–6 „ |

Size large and build powerful; general colour jet-black, the femora orange.

Antennæ yellowish-brown; third segment relatively very long.

Head black, smooth, sutures distinct.

Pronotum nearly square, but wider than long and gently broadened posteriorly, all black, smooth.

Sternal plates black; prosternum constricted.

Legs sometimes all black, sometimes femora orange-yellow tipped with black; tibiæ and tarsi dark, blackish brown.

Abdomen moderately dilated, jet-black, very finely and densely punctulate; sides of fifth to ninth segments in ♂ acute and rugulose.

Last dorsal segment ♂ ♀ nearly square and nearly smooth.

Penultimate ventral segment ♂ obtusely rounded, apically truncate; in ♀ rather acutely rounded.

Parameres short and dilated, outer margin sinuous and sharply pointed at the apex.

Forceps with the branches ♂ remote, stout, and trigonal, with an almost rectangular dilation on inner margin, abruptly attenuate and abruptly and asymmetrically bowed, unarmed; in the ♀ contiguous, straight at first, in apical half gently and asymmetrically sinuous, inner margin denticulate.

Abyssinia: Jakka and Kulme, 8 ♂, 12 ♀ (*Kristensen*, coll. Petersen and c. m.).

This species closely resembles some forms of *A. mauritanica*, Luc., but differs in the basal dilation of the forceps of the male, thus approaching *A. maritima*, which has not bicolorous legs.

The colour is a much deeper black than in *A. mauritanica*, with no trace of red tint, the pronotum less decidedly transverse, the pitting of the abdomen denser and stronger.

From *A. maritima* it also differs in the finer pitting, more acute and rugulose sides of the abdomen in the ♂, and more decidedly truncate pronotum.

It differs markedly from both in the short dilated apical

segments of the parameres, which agree with the description and figures of the parameres of *Gelotolabis burri* of Zacher; the descriptions do not agree, so this species is distinct from *G. burri*; but if the genus *Gelotolabis* is to stand, this species will probably fall into it.

*Anisolabis kristenseni*, sp. n.

Statura sat magna; corpus atrum, capite pedibusque rufo-fulvis; pronotum sublatius quam longius; abdomen ♂ sat dilatatum, segmentis 5–9 lateribus acutis et rugulosis; segmentum penultimum ventrale ♂ late rotundatum, apice truncatum; parameres angusti, lanceolati; forcipis bracchia ♂ basi remota, triquetra, asymmetrica, haud dentata.

| | ♂. | ♀. |
|---|---|---|
| Long. corporis..... | 21–23 mm. | 20–23·5 mm. |
| „ forcipis ..... | 4 „ | 5 „ |

Size rather large and build powerful.

General colour jet-black, the head deep orange-red and legs orange.

Antennæ grey-brown, basal two segments yellowish.

Head smooth, tumid, deep orange-red, sutures distinct; eyes small.

Pronotum nearly square, but slightly wider than long, all sides straight; slightly wider posteriorly than anteriorly; smooth.

Meso- and metanotum smooth.

Sternum dirty yellow; prosternum almost parallel-sided; mesosternum rounded; metasternum truncate.

Legs orange-yellow; tarsi long, first segments, with bristles and pubescence, as long as second and third united.

Abdomen moderately dilated before the apex in both sexes; jet-black, the upper surface finely rugulose; in the ♂ the sides of segments 5 to 9 are acute and rugulose.

Last dorsal segment ♂ transverse, rectangular, nearly smooth; in ♀ slightly narrowed.

Penultimate ventral segment ♂ broadly rounded, the apex truncate; in ♀ obtusangular.

Apical segment of parameres narrow, almost lanceolate, nearly four times as long as broad.

Pygidium ♂ ♀ with a depression, but no tubercles.

Forceps with the branches ♂ remote, stout, trigonal in basal half, abruptly attenuate in the apical half, strongly and asymmetrically bowed, with no teeth, but nearly obsolete denticulation on inner margin; in the ♀ feebly bowed,

rather remote at the base, more gradually attenuate, the inner margin crenate, with one rather strong tooth.

Abyssinia: Jakka, 2200 m., and Kunhe, in the mountains, on the road from Harrar to Adis-Abba (11 ♂, 6 ♀, *Kristensen*, c. m.).

This is a distinct and handsome species; it rather resembles *A. felix*, Burr, but differs in the absence of the rectangular dilation of the forceps.

*Spongovostox schläferi*, sp. n.

*S. quadrimaculato* vicinus; ab eo differt tantum; pygidio ♂ prominenti, latum, utrinque dilatatum, medio in lobulum longum linguæformem producto.

| | ♂. |
|---|---|
| Long. corporis ..... | 10 mm. |
| „ forcipis ..... | 3·75 „ |

In coloration, build, and structure generally exactly resembles *S. quadrimaculatus*, but the pygidium of the male is totally different, prominent, broad, dilated on both sides, the dilation ending on each side in an acute point, directed posteriorly, the middle portion being produced into a long, parallel-sided, tongue-shaped lobe, rounded apically.

Kamerun, 1 ♂ (*Schläfer*, type in Berlin Museum).

*Spongovostox spatulus*, sp. n.

*S. quadrimaculato* vicinus; differt pygidio dilatato, lateribus apiceque acuminatis.

| | ♂ ♀. |
|---|---|
| Long. corporis ..... | 8–9·5 mm. |
| „ forcipis ..... | 3–4 „ |

Allied to *S. quadrimaculatus*, but the pygidium is different; it is diamond-shaped—that is, dilated about the middle, with angular sides, and acute at the apex; the penultimate ventral segment of the ♂ is broadly rounded and gently sinuate in the middle of the posterior margin; branches of the forceps straight, with a triangular lamination near the base to the inner margin, with a few nearly obsolete teeth.

British East Africa: Kibwezi, 1. iii. 08, 1 ♂ (*Scheffler*). German East Africa, 2 ♂, 1 ♀ (*Conradt*). (Type in Berlin Museum.)

*Spongovostox conradti*, sp. n.

Statura robustiori; elytra immaculata; pygidium breve, latum, basi parallelum, apicem versus angustatum, apice ipso bifido;

forcipis bracchia ♂ remota, valida, basi subdilatata, apice ipso mucronata.

| | ♂. | ♀. |
|---|---|---|
| Long. corporis ..... | 7·5 mm. | 6·5 mm. |
| „ forcipis ..... | 1·5 „ | 1 „ |

Build rather stout; general colour pale brown.

Antennæ with 14 segments, yellowish brown, the anteapical segments paler.

Head brown, smooth, broad, sutures obsolete.

Pronotum brown, the sides and metazona much paler, broadened posteriorly, sides straight, hinder angles rounded.

Elytra ample, smooth, dull brown.

Wings prominent, very pale yellow, with a large brown spot.

Femora brown; tibiæ and tarsi pale yellowish.

Abdomen brown, rather broad, parallel-sided in the ♂, narrowed apically in the ♀.

Last dorsal segment ♂ rectangular, transverse; in the ♀ narrowed.

Penultimate ventral segment ♂ broadly rounded, sinuate in middle of posterior margin.

Pygidium ♂ short, broad, parallel-sided in basal half, then narrowed, the apex bifid, with short sharp lobes; in the ♀ short, parallel-sided, apically truncate.

Forceps with the branches in the ♂ remote, rather stout, depressed, subdilated in basal half, the portion ending in a minute sharp tooth; somewhat constricted beyond this, and then subdilated again to the apex, which is abruptly attenuate and sharply hooked: in the ♀ simple.

Togo: Bismarkburg, 11. vi.–18. x. 93, ♂ and ♀ (*Conradt*, in Mus. Berlin).

This species in size, build, and coloration approaches *S. assiniensis*; it differs in the form of the pygidium and forceps of the male.

### *Spongovostox kristenseni*, sp. n.

Statura mediocri vel minore; colore fusco-castaneo, fulvo-variegato; pronotum latius quam longius; elytra fusca, fulvo-maculata; alæ nigræ, vel longæ, vel abbreviatæ; segmentum ultimum dorsale ♂ transversum, utrinque tumidum; pygidium ♂ brevissimum; latum, margine postico sinuato; forcipis bracchia ♂ valde remota, basi ipso triquetra, valida, et dilatata, abrupte attenuata ac deorsum curvata, dehinc attenuata, arcuata, ante apicem dente parve armata.

| | ♂. | ♀. |
|---|---|---|
| Long. corporis..... | 7·5–8 mm. | 6·5–7 mm. |
| „ forcipis..... | 3–3·75 „ | 2 „ |

Size small; general colour dark chestnut, varied with fulvous; shining; not very pubescent.

Antennæ greyish brown, with 14–15 segments, cylindrical, fourth a little shorter than the third.

Head broad, smooth, sutures obsolete, tumid, dark chestnut-brown.

Pronotum a little broader than long, very slightly broader posteriorly than anteriorly, alike in macropterous and brachypterous forms, deep chestnut-brown, paler at the sides, which are gently convex, as also the anterior margin; posterior margin truncate.

Elytra ample, smooth, dark chestnut-brown, with a prominent orange spot in the anterior portion, which sometimes occupies the whole of the disc and is sometimes nearly obsolete.

Wings black, sometimes well developed, sometimes abbreviated.

Legs yellow.

Abdomen rather broad, subparallel-sided, deep red, very finely punctulate, almost smooth.

Last dorsal segment ♂ transverse, smooth, truncate posteriorly, feebly depressed in the middle; inflated at each angle to a tubercle, which is sometimes merely tumid, sometimes developed into a mammæform tubercle: in the ♀ simple.

Penultimate ventral segment ♂ ♀ ample, broad, very gently rounded posteriorly.

Pygidium ♂ very short, not protruding, broad, posterior margin sinuate; ♀ hidden.

Branches of the forceps remote; strong, trigonal, and dilated at the base itself, then abruptly attenuate, bent downwards, somewhat bowed, and arcuate, to meet at a small nearly obsolete tooth just before the apex: in ♀ simple, contiguous.

Western Abyssinia: Kuhne, in the mountains, on the road from Harrar to Adis Abba, many specimens (*G. Kristensen*).

This species is closely allied to the West-African *S. tuberculata*, Borelli, and *S. rubra*, Borelli; the coloration is different, and the forceps, though of the same general type, are different in detail. In these species the last dorsal segment is furnished at each angle with a very prominent, sharp, stout, conical tubercle, quite different from the sometimes mammæform tumid elevation of *S. kristenseni*.

Mr. Kristensen sent me a good number of specimens; the commonest form is brachypterous, with the elytra almost entirely orange-yellow on the disc; a few males are macropterous, and they have the yellow spot much feebler, smaller,

and darker. In the females the two forms occur in about equal numbers.

The brachypterous and macropterous forms are, at first glance, very different in appearance, but I am convinced that it is merely a case of dimorphism, such as is common in earwigs.

### *Labia owenii*, sp. n.

Parva, colore atro, forcipe alisque aurantiacis; corpus pilosum; pygidium ♂ prominens, fere parallelum, apice bispinuloso; forcipis bracchia ♂ arcuata.

| | ♂. | ♀. |
|---|---|---|
| Long. corporis..... | 5·5–6 mm. | 6 mm. |
| „ forcipis ..... | 1 –1·5 „ | 1·1–5 „ |

Small; densely clothed with bristles; general colour jet-black, the wings and forceps deep orange.

Antennæ with 13–14 segments; fourth about half as long as third, fifth nearly equal to third; all cylindrical; 1–2 black, 3, 7, 8 orange, the rest blackish.

Head smooth, tumid, sutures obsolete, broad, jet-black.

Pronotum jet-black, transverse, all sides very gently convex, angles rounded; prozona feebly tumid; covered with close, short, yellow pubescence.

Elytra broad, jet-black, densely clothed with black bristles and golden pubescence.

Wings with golden pubescence, deep orange-red, with black sutural band.

Femora and tibiæ black, the former rather thick; tarsi yellowish.

Abdomen broad, jet-black, with golden pubescence.

Last dorsal segment smooth; transverse in ♂, narrowed in ♀.

Penultimate ventral segment ♂ broad, posterior margin roundly emarginate on each side, with a rounded median lobe; in ♀ rounded.

Pygidium ♂ prominent, depressed, nearly parallel-sided, gently narrowed apically, the apex itself roundly concave, with a sharp spine on each side; in the ♀ almost conical, strongly narrowed, with two minute spinules at the apex.

Forceps with the branches in ♂ deep orange, tipped with black, gently arcuate.

West Africa: Liberia (2 ♂, ♀, *S. G. Owen*, c. m.).

This striking little black and orange species I first confused with *L. marginalis*; but, apart from the distribution of colours, the form of the forceps and penultimate ventral segment of the male are distinctive.

I have pleasure in dedicating it to my friend Mr. S. G. Owen, A.R.S.M., who took it in Liberia.

*Platylabia styligera*, sp. n.

Statura minore; caput, pronotum, elytra, alæ nitida, atra; abdomen, pedes, forceps læte rufa; pygidium ♂ longum, valde acuminatum; forcipis bracchia ♂ leviter arcuata, medio dente forti acuto armata.

| | ♂. |
|---|---|
| Long. corporis..... | 4·5–5·5 mm. |
| „ forcipis ..... | 1·75 „ |

Size small; build moderately slender.

Antennæ yellowish brown, with about 10 segments, all cylindrical, fourth about as long as the third.

Head shining black, smooth, and broad; eyes small; posterior margin feebly sinuate.

Pronotum shining black, slightly longer than broad, sides parallel, truncate posteriorly; anterior margin rather strongly convex, ending in a small but distinct neck.

Elytra and wings well developed, smooth, shining black.

Legs orange-yellow, not very long; femora thick, tarsi slender.

Abdomen bright orange-red, parallel, with long thin bristles at the sides; lateral tubercles obsolete.

Last dorsal segment ample, smooth, quadrate; posterior margin gently tumid over roots of forceps.

Pygidium long and narrow, thick at the base, produced to a slender, long, sharp spine.

Forceps with the branches remote, straight at first; elongate, depressed, feebly arcuate apically, with long fine bristles; armed in the middle of the inner margin with a depressed, long, sharp tooth directed apically.

Annam: Phuc Son, November and December (*H. Fruhstorfer*, 2 ♂ in c. m.).

The armature of the forceps and pygidium of this little species is very distinctive.

Type in my collection.

V.—*Notes on the* Forficularia. — XIX. *On little-known Earwigs from Formosa.* By Malcolm Burr, D.Sc., F.E.S., F.Z.S., F.G.S.

In 1905 and 1907 Professor T. Shiraki, partly in collaboration with Professor S. Matsumura, published four papers on the Dermaptera of Japan and Formosa, describing a number of new species.

Unfortunately the work is not good, the descriptions often insufficient, and the species with difficulty recognizable.

The four papers in question are exceedingly difficult to obtain, and I was unable to find a copy in England. Eventually a copy was kindly lent me by Mr. A. P. Semenoff-Tian-Shansky, of St. Petersburg, at whose request I reviewed them, and critically discussed them at length in the 'Revue russe d'Entomologie,' pp. 335–340 (1909), and gave my reasons for suggesting affinities for the species described, judging from the often very inadequate and old-fashioned descriptions. This paper was in Russian, but a translation in English appeared in the 'Entomological Record,' 1910, p. 134.

By good fortune I have received or come across five species from Formosa which I am able to identify with five of Shiraki's species, and it is gratifying to find that in every instance the examination of the specimens confirms the suggestions, which were only based upon the descriptions. These five can therefore be removed from the limbo of doubtful and unrecognizable forms, into which practically all of Shiraki's species had been thrown, and take their proper place in the system.

*Euborellia pallipes*, Shiraki.

Shiraki describes a female under the name *Anisolabis pallipes* (Tr. Sapporo N. H. Soc. i. p. 93, fig. 3, 1905/06).

The description does not tell us much, but the figure is suggestive of a large *E. stâli*, on account of the form of the rudimentary elytra.

In the Munich Museum there is a male from Kushaku, Formosa, which I refer with no hesitation to this species; it is a trifle larger, the length of the body being 10·5 mm. compared with Shiraki's figure of 7·1 mm. for the female.

It is very closely allied to *E. stâli*, Dohrn, but the build is slenderer and the punctulation feebler; the elytra are very narrow at the base, whereas they are practically parallel-sided in *E. stâli*. The pronotum is a little shorter and

broader, truncate posteriorly, with the hinder angles sharp, whereas in *E. ståli* they are gently rounded off. The forceps are a little less remote and less curved and the last dorsal segment a little narrower.

### *Anechura crinitata*, Shiraki.

*Apterygida crinitata*, Shir. Tr. Sapporo N. H. Soc. vol. i. pt. 2, p. 11 (1905/06).

Shiraki does not figure this species, but from his description it is evident that it is an *Anechura* or an *Allodahlia*, as I suggested in my review.

I have received a small series from Tainan agreeing with his description which are referable to *Anechura* and closely related to *A. torquata*, Burr, from Tonkin, of which it may be regarded as a local form.

It is a smaller and feebler insect, the colour is darker, and the forceps weaker in every respect. It is very hairy. The elytra vary from nearly black to dark chestnut, banded externally with tawny.

Shiraki refers to the basal antennal segment as "dreikantig." I think this must be a mere mistake of observation.

### *Forficula harbereri*, n. n.

*Forficula ruficeps*, Shiraki, *op. cit.* p. 8 (1905/06) (nec Erichson, nec Burmeister).

The description shows this to be a true *Forficula*, which I suggested in my review of Shiraki's work.

In the Munich Museum I have found a single male from the mountains in the north of Formosa, taken by Harberer at the end of May.

Superficially it resembles *F. auricularia*, and the build and coloration are very similar; the forceps recall those of *F. robusta*, Sem., but it cannot be confused with that powerful species. The dilation of the forceps extends through about two-thirds of their length, and ends with no tooth, at a slightly obtuse angle; the apical third is elliptically arcuate: the forceps are much the same as in *F. imprevista*, Burr (East Africa), but much less arcuate; they still more closely resemble those of the more powerful *F. rodziankoi*, Sem. (East Africa), or at least those specimens, often referred either to *F. rodziankoi* or *F. senegalensis* *, in which the dilation ends with no tooth.

* Until the true relationship and status of the Ethiopian members of *Forficula* are determined.

*Timomenus aeris*, Shiraki.

*Apterygida aeris*, Shir. *op. cit.* p. 9 (1905/06).

Shiraki described this species upon a single female, and gave no figure; I did not venture to hazard a guess as to its position.

I have received a small series from Tainan and Kosempo, representing both sexes, the female of which agrees so well with the description that I do not think there is any doubt as to its identity.

It is an elegant and well-marked species, undoubtedly referable to *Timomenus*; the last dorsal segment of the male is compressed laterally, and has exactly the appearance of having been pinched together between a finger and thumb.

The basal antennal segment, especially in the male, is swollen or inflated, much more strongly in the male than in the female. The forceps of the male, which vary in length from 6 to 12 mm., are contiguous and depressed at the base, elongate, slender, and attenuate, gently arcuate in the apical half, the slender tips overlapping in repose; there is a short sharp tooth in the middle.

It is closely related to *T. shelfordi*, Burr, from Sarawak, agreeing almost exactly in structure, but differing entirely in coloration.

*Timomenus flavocapitatus*, Shiraki.

*Apterygida flavocapitata*, Shir. *op. cit.* p. 10 (1905/06).

My suggestion that this species may be referable to *Timomenus* proves correct; I have two males, one from Tainan and one from Kosempo, which agree with the description. It is the largest member of the genus and perhaps the most elegant earwig known. The longest pair of forceps measures 15 mm. Its nearest relative is *T. nevilli*, Burr, from the Himalayas. It resembles that species generally in build and appearance, in the green sheen of the pronotum and abdomen, contrasting with the dull elytra and wings, and in the form of the forceps.

It differs in the pale yellow head, strongly contrasted with the rest of the body, but chiefly in the form of the pronotum; in *T. nevilli* this is rounded and a little narrowed posteriorly, and the sides are gently rounded; in this species the sides are quite parallel and the posterior margin is convex or obtuse-angular.

## VI.—*Description of a new African Fish of the Genus* Clarias *from Lake Rukwa.* By G. A. Boulenger, F.R.S.

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Little is known of the fishes of Lake Rukwa, south-east of Lake Tanganyika. Twelve species have been enumerated by Hilgendorf and Pappenheim (Sitzb. Ges. naturf. Fr. Berl. 1903, p. 259), the determinations of some of which appear to be in need of revision. On the occasion of a recent visit Mr. F. H. Mellard has been so good as to preserve a few fish for the British Museum; among these I may notice *Amphilius platychir*, Gthr., *Clarias gariepinus*, Burch., and a new *Clarias* which I propose to name, in memory of the late Prof. Franz Hilgendorf,

*Clarias hilgendorfi.*

Depth of body $6\frac{1}{2}$ times in total length, length of head $4\frac{2}{3}$ times. Head $1\frac{2}{3}$ times as long as broad, smooth; occipital process longer than broad, acutely pointed; frontal fontanelle sole-shaped, $2\frac{1}{2}$ times as long as broad; occipital fontanelle narrow, elongate, partly on occipital process; eye very small, 3 times in length of snout, 6 times in interorbital width, which is a little less than $\frac{1}{2}$ length of head; band of præmaxillary teeth not quite 4 times as long as broad; vomerine teeth granular, forming a curved band which is nearly as broad as the præmaxillary band; nasal barbel $\frac{2}{3}$ length of head, maxillary $1\frac{1}{4}$, outer mandibular nearly 1, inner mandibular $\frac{2}{3}$. Gill-rakers few, 12 on first arch. Clavicles concealed under the skin. Dorsal 73, its distance from occipital process $\frac{1}{4}$ length of head. Anal 62. Dorsal and anal extending almost to the very root of the caudal. Pectoral not quite $\frac{1}{2}$ length of head, spine short, strongly serrated on both sides. Ventrals very small, $1\frac{2}{3}$ times as far from caudal as from end of snout. Caudal $\frac{1}{2}$ length of head. Uniform blackish brown; caudal with a narrow light edge.

Total length 130 mm.

A single specimen.

Allied to *Cl. laviceps*, Gill. Distinguished by the granular vomerine teeth, fewer gill-rakers, fewer dorsal and anal rays, and a longer and narrower occipital process.

VII.—*Descriptions of Three new Tree-Frogs discovered by Mr. A. E. Pratt in Dutch New Guinea.* By G. A. Boulenger, F.R.S.

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*Hyla pratti.*

Tongue subcircular, slightly nicked; vomerine teeth in two small groups between the choanæ. Head as broad as long; snout rounded, scarcely prominent, hardly as long as orbit; canthus rostralis distinct; loreal region oblique, concave; nostril equally distant from eye and from end of snout; interorbital region as broad as the upper eyelid; tympanum distinct, not quite half the diameter of the eye. Outer fingers distinctly webbed at the base, toes three-fourths webbed; disks as large as the tympanum; subarticular tubercles small, feebly prominent; no tarsal fold; no outer metatarsal tubercle. The tibio-tarsal articulation reaches the tip of the snout; tibia a little more than half as long as head and body. Upper parts with more or less distinct small flat warts, lower granulate. Bluish grey above in spirit (green in life?), uniform or with small irregular black spots, whitish beneath, throat sometimes speckled with greyish. Male with an external vocal sac and brown nuptial rugosities on the inner finger.

From snout to vent 50 mm.

Three specimens from Wendessi; others from the Arfak Mountains at an altitude of 8000 feet.

*Hylella chloronota.*

Tongue oval, slightly nicked. Head as broad as long; snout rounded, scarcely prominent, as long as orbit; canthus rostralis distinct; loreal region nearly vertical; interorbital space broader than the upper eyelid; tympanum distinct, about half the diameter of the eye. Outer fingers one-third webbed; toes nearly entirely webbed; disks of fingers as large as the tympanum; subarticular tubercles moderate. The tibio-tarsal articulation reaches the tip of the snout; tibia not quite half length of head and body. Skin smooth above; throat, belly, and base of lower surface of thighs very coarsely granulate; no fold across the chest. Green above, white beneath, the green colour forming a narrow stripe along the upper surface of the thighs. Male with an internal vocal sac and brown nuptial rugosities on the inner finger.

From snout to vent 27 mm.

Two specimens from the Arfak Mountains at an altitude of 8000 feet.

*Hylella longicrus.*

Tongue subcircular, slightly nicked. Head as broad as long; snout rounded, scarcely prominent, shorter than orbit; canthus rostralis distinct; loreal region oblique, concave; interorbital space broader than the upper eyelid; tympanum distinct, not quite half the diameter of the eye. Outer fingers half-webbed; toes nearly entirely webbed; disks of fingers as large as the tympanum; subarticular tubercles very feeble. The tibio-tarsal articulation reaches considerably beyond the tip of the snout; tibia three-fifths length of head and body. Skin smooth or finely areolate above; belly and base of lower surface of thighs granulate; throat smooth; no fold across the chest. Green above; flanks, upper surface of thighs, and hands and feet colourless, with green dots or reticulation; a white band from below the eye to the angle of the mouth; throat and belly white.

From snout to vent 33 millim.

Two female specimens—one from Fak Fak, the other from Wendessi.

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VIII. — *Further Descriptions of new Freshwater Fishes discovered by Dr. W. J. Ansorge in Portuguese Guinea.* By G. A. Boulenger, F.R.S.

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Before leaving Portuguese Guinea Dr. Ansorge has sent to the British Museum a further large series of fishes obtained at or near Bafata, among which are representatives of two new species to be added to the six described in the April number of these 'Annals' (vol. vii. p. 373).

*Synodontis annectens.*

Intermediate between *S. sorex*, Gthr., and *S. clarias*, L. Agreeing with the former in the length of the snout, which is more than half the length of the head and three times the diameter of the eye in the adult, with the latter in the maxillary barbel. Further differs from *S. clarias* in having the spine of the dorsal fin perfectly smooth in front and the serration on the inner side of the pectoral spine much more feeble in the adult.

This *Synodontis* was already represented in the collection of the British Museum by a specimen from Nianimaru, Gambia, presented by the late Mr. J. S. Budgett, to which I have specially alluded in my 'Fishes of the Nile,' p. 379, and which I then felt inclined to regard as a distinct species. Now, with several species before me, obtained by Dr. Ansorge in the Culufi and Geba Rivers, I feel compelled to bestow a name on the long-snouted specimens, notwithstanding the fact that somewhat similar examples, as regards the proportions of the head, occur in the Nile, according to Vaillant (N. Arch. Mus. viii. 1896, p. 105).

The largest specimen measures 270 mm.

*Tilapia brevimanus.*

Depth of body $2\frac{1}{2}$ to $2\frac{3}{4}$ times in total length, length of head 3 times. Head twice as long as broad, upper profile convex; snout as long as broad, slightly longer than eye, which is $3\frac{1}{3}$ times in length of head, equals interorbital width, and slightly exceeds depth of præorbital; mouth extending to between nostril and eye; outer teeth moderately large, bifid, 50 to 60 in upper jaw, followed by 4 or 5 regular and well-separated series of smaller tricuspid teeth; 3 series of scales on the cheek, the vertical diameter of the scaly part below the eye $\frac{3}{5}$ to $\frac{2}{3}$ diameter of latter. Gill-rakers short, 13 on lower part of anterior arch. Dorsal XVI 12; spines increasing in length to the last, which measures about $\frac{3}{5}$ length of head; soft portion pointed, produced into a long filament in the male. Anal III 8; third spine longest, as long as last dorsal, soft portion produced like the dorsal. Pectoral a little shorter than head, not reaching vertical of origin of anal. Ventral produced into a long filament, reaching vent or anal. Caudal truncate. Caudal peduncle nearly as long as deep. Scales not denticulate, 31–32 $\frac{3}{11-12}$; lat. lines $\frac{22}{11-12}$. Yellowish olive above, whitish beneath; 8 or 9 dark brown cross-bands on the head and back, not descending to the belly, the first between the eyes; fins olive, dorsal and anal with yellowish spots at the base; a dark basal spot at the origin of the soft dorsal.

Total length 130 mm.

Several specimens from the Geba River.

Distinguished from *T. melanopleura*, A. Dum., by the more elongate form, the shorter pectoral fin, and the larger eye.

## IX. — *On some* Tipulidæ (Limoniinæ) *from Ceylon in the British Museum Collection, with Descriptions of Eight new Species.* By F. W. Edwards, B.A.

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The insects treated of in this paper were contained in three collections made in Ceylon and presented by the collectors to the British Museum :—

(1) Mr. E. E. Green's collection, made between 1888 and 1897.
(2) Lt.-Col. J. W. Yerbury's collection, made in 1890–92.
(3) Mr. T. Bainbrigge Fletcher's collection, made in 1907–8.

Only the insects belonging to the subfamily Limoniinæ (*Tipulidæ brevipalpi*, O.-S., *Limnobiidæ*, auctt.) are here described. These all belong to widely distributed genera, but many of the species are of considerable interest. The occurrence of the genus *Styringomyia* in this region is interesting; it seems to have a very wide range in the tropics of the Old World.

Of the sixteen species represented in the three collections, eight are here described as new, while of the remaining eight only four (*Eriocera crystalloptera*, *E. humberti* and *E. albonotata*, and *Conosia irrorata*) had previously been recorded from Ceylon. The species of *Eriocera*, as has been noticed before, vary to a rather remarkable extent, particularly in their neuration.

1. *Thrypticomyia saltens*, Dol. Natuurk. Tijdschr. Ned. Ind. xiv. p. 390, pl. ii. fig. 3 (1857) (as *Limnobia*).

Syn. *Dicranomyia saltans*, Ost.-Sack. Berl. ent. Zeit. 1882, p. 88.

Although there are marked differences between this species and *T. auripennis* in the neuration, it is here referred without any hesitation to the genus *Thrypticomyia*. In the structure of the antennæ, and the shape of the wings and abdomen, there is hardly any divergence; these three characters I regard as the essential ones of the genus.

As the original description was rather short, and in Dutch, I append another :—

*Antennæ* 14-jointed, but the last joint constricted in the middle, so that they appear almost as though they were

15-jointed ; bristles very similar to *T. auripennis* ; slightly shorter than thorax. *Thoraæ* ochreous brown (♂) or dark brown (♀), of the characteristic subglobular shape. *Legs* very long and thin, dark fuscous ; coxæ ochreous in male ; apical $\frac{3}{5}$ of metatarsi white, the last four joints white, tinged with reddish ochreous in the male ; metatarsi three times as long as the remaining four joints together, those of the front legs somewhat longer than those of the other two pairs. *Wings* hyaline, with coppery reflections ; stigma distinct, about twice as long as broad ; cells round the apex very short ; the præfurca springs from the first vein beyond $\frac{1}{3}$ of the wing's length ; auxiliary vein terminates at about $\frac{2}{3}$, with the subcostal cross-vein at its tip ; marginal cross-vein slightly beyond middle of stigma, at the tip of the first vein, which tip being bent up to the costa, there is no supernumerary cross-vein ; axillary terminates slightly beyond tip of auxiliary. *Halteres* very long (about equal in length to the whole thorax), blackish, base of stalk in male ochreous. *Abdomen* brown, much narrowed at base in both sexes ; fleshy lobes of male genitalia unusually long.

Length of body 9 mm. ; wing 9 mm. Doleschall gives the length as $2\frac{1}{2}'''$, but indicates the correct length ($4'''$) in his figure.

In connection with the peculiar habits of a species of this genus in the Seychelles Islands, noticed by Mr. Hugh Scott in Trans. Linn. Soc. xiv. part 1, p. 32, it is interesting to find a reference to the habits of *T. saltens*. Osten-Sacken states that, according to Doleschall, "It is often found in dwellings, principally in the corners, in large numbers, dancing up and down in the air ; they keep so close together that they seem to hold each other in dancing, and to form a regular chain." In view of Scott's interesting discovery, which he says required close and careful observation to find out, *i. e.* that the Seychelles species hangs in chains from fine web-threads, it seems possible that *T. saltens* uses cobwebs in the corners of rooms for a similar purpose.

*Hab.* Uva P. Madulsima, 25. v. 1908, 1 ♂ and 1 ♀ (*T. Bainbrigge Fletcher*).

2. *Thrypticomyia longivena*, sp. n., ♀.

Ochracea, alis hyalinis, tarsis pedum posticorum albis ; vena mediastinali post ortu præfurcæ in costa terminata.

*Head* : *antennæ* brownish, slightly longer than thorax ; 14-jointed, last joint with the apical half narrower, so that it has the appearance of being divided. Joints of flagellum

strikingly pedicellate, the glabrous pedicels occupying from $\frac{1}{3}$ to $\frac{1}{2}$ the length of the joint, and being only $\frac{1}{4}$ as broad as the broadest part; broad portion more or less conical, the apex of the cone being towards the base of the joint; these broad portions are provided with a verticel of fine hairs, three or four shorter bristles and one longer dorsal bristle, the hairs being $\frac{2}{3}$, the shorter bristles about $1\frac{1}{2}$ and the longer about $2\frac{1}{2}$ times as long as the breadth of the conical portion of the joint. *Thorax* ochreous, mesonotum with a rather broad dark brown central stripe reaching back to the suture. *Legs* rather dark brown, coxæ and femora towards base ochreous, posterior tarsi and apical fifth of tibiæ white, tarsi somewhat brownish tinged towards tip; middle tarsi brown like the femora and tibiæ. Posterior tarsi scarcely more than half, middle two-thirds, as long as their tibiæ. Anterior legs missing. *Wings* hyaline, with golden reflections, but less brilliant than in the other species of the genus; a distinct though rather diffused stigma. The wing has the typical cuneiform shape, but there is a slight indication of an anal angle. Base of basal cells at $\frac{1}{4}$ of wing-length. Mediastinal vein reaching costa much beyond origin of præfurca, about halfway between that and the apex of the first longitudinal vein. Subcostal cross-vein close behind apex of mediastinal vein. Marginal cross-vein and tip of first longitudinal rather indistinct, forming an obtuse angle about the middle of the stigma. Discal cell subquadrate, great cross-vein about $\frac{1}{3}$ of the way along its lower side. *Halteres* rather long, stalk ochreous brown, knob dark brown. *Abdomen* only slightly constricted at base, brown, apical segments ochreous, venter ochreous.

Length of body 4·5 mm.; wing 5 mm.

This species must apparently come in the genus *Thryptocomyia*, though like *T. saltens* it shows considerable divergence from the type, notably in the long mediastinal vein, the less elongated wings, and the less constricted abdomen. Unfortunately we have no male.

*Hab.* Dondra, 3. xii. 1907, 1 ♀ (*T. Bainbrigge Fletcher*).

### 3. *Geranomyia fletcheri*, sp. n., ♀.

Fusca, alis unicoloris subfuscis, rostro thorace vix longiore.

*Head* including rostrum and antennæ dark brownish black. Antennal joints cylindrical, $1\frac{1}{2}$ times as long as broad. Rostrum slightly longer than thorax; palpi apparently two-jointed, placed just before middle of rostrum. *Thorax* dark brownish black, with a small ochreous-brown spot on each

side on the front margin of the mesonotum, and another above and behind the insertion of the wings. *Legs* dark brown, coxæ ochreous brown, femora somewhat lighter towards base. *Wings* uniformly fuscous-tinged, unspotted except for the stigma and a faint brown cloud at the base of the præfurca. Mediastinal vein reaching costa considerably beyond origin of præfurca, subcostal cross-vein near its tip. Marginal cross-vein nearly three times as long as the upturned tip of the first longitudinal, with which it is nearly in a line. Second posterior cell with a rectangular base; third longer than second, its upper margin rounded towards the base. Great cross-vein at or just before the base of the discal cell. *Halteres* with the knob brown, the stem ochreous. *Abdomen* dark fuscous.

Length of body 5 mm. (excluding rostrum); wing 6 mm.

*Hab.* Madulsima, 21. xii. 1907 (2 ♀), 19. v. 1908 (type ♀) (*T. Bainbrigge Fletcher*).

4. *Libnotes pœciloptera*, O.-S. Ann. Mus. Civ. Genova, xvi. p. 403.

Pundaluoya (*E. E. Green*).

5. *Teucholabis cyanea*, sp. n.

Cyanea, abdomine purpureo-cyaneo; pedibus luteis, femoribus apice nigris incrassatis; alis fasciis 4 fuscis.

*Head* shining dark purple, almost metallic, slightly hairy on vertex. Antennæ with the scape ochreous, the flagellum fuscous, clothed with a rather dense pubescence; joints ovate-cylindrical, about twice as long as broad. *Thorax* shining blue-black, submetallic; mesopleuræ dull whitish. *Legs*: coxæ, trochanters, and basal $\frac{3}{5}$ of femora ochreous, apical fourth of femora brownish or purplish black, preceded by a pale ochreous ring; the apices of all the femora are thickened, those of the hind legs to the greatest extent. Tibiæ and tarsi of the fore and mid legs greyish ochreous, darker towards the tips. Hind tibiæ with the basal two-thirds ochreous, apical third blackish and somewhat thickened. Hind tarsi blackish except for basal half of metatarsus, which is ochreous. *Wings* hyaline, iridescent, with four brown cross-bands, which are darker towards the costa: the first of these is at the base of the basal cells, the second is mainly before, but includes the origin of the præfurca; the first extends only halfway across the wing and is connected with the second by a longitudinal brown patch occupying

the space between the fifth and seventh veins; the third and broadest band includes the cross-veins, lying mainly beyond them, it is broadest in the middle of the wings and extends to the apex of the discal cell; the fourth band occupies the whole of the apex of the wing. The præfurca arises about the middle of the wing, and is obtusely angulated near its base. Marginal cross-vein considerably beyond the fork of the radial vein and near the termination of the subcostal. Small cross-vein almost in a line with base of submarginal cell, situated at the base of the discal cell. First posterior cell very slightly contracted at apex. Discal cell very narrow, tapering almost to a point at the base. Sixth vein slightly sinuous. Wing-margin indented at the terminations of the sixth and seventh longitudinal veins. Great cross-vein a little beyond the base of the discal cell. *Halteres* black, apical half of knob white. *Abdomen* with the first segment and the base and sides of the second shining blue-black, the remainder of the dorsum purplish brown, somewhat shining; venter brown.

Length of body 3·5 mm.; wing 4 mm.

The uniform blue-black colour of the dorsum of the thorax will distinguish this species from any other in the genus. It is the smallest species, except for *T. polita*.

*Hab.* Madulsima, 19. v. 1908, 1 ♂ (*T. Bainbrigge Fletcher*); Bentota, 13. vi. 1890, 1 ♀ (*Lt.-Col. Yerbury*).

### 6. *Styringomyia ceylonica*, sp. n., ♂.

Grisco-ochracea, pedibus annulatis, antennarum art. 2 nigro, thorace vittis 2 anterioris nigro-fuscis; alis nigro-punctatis, apicis venarum pallide infuscatis.

*Head* greyish ochreous, with black bristles; tips of palpal and first antennal joints darker; second antennal joint entirely black. *Thorax*: *prothorax* dark brown at the sides, greyish ochreous in the middle, with a dark median line posteriorly; a tuft of black bristles on each side in front. *Mesonotum* with the ground-colour cinereous above, ochreous at the sides; two distinct blackish-brown bands, closely approximated in front, somewhat divaricated behind, continued as far back as the suture as narrower and lighter bands; outside these on each side is a narrow, indistinct brown band, starting from a small pale ochreous depression near the front margin; behind the suture are two brown spots; two distinct rows (one on each side of the median line) of black bristles. *Scutellum* greyish ochreous, with two black bristles. *Metanotum* dark brown. *Pleuræ* greyish

ochreous. *Legs* greyish ochreous; all the femora with two complete brown rings, on the front pair at $\frac{3}{5}$ and $\frac{4}{5}$, on the middle pair at $\frac{3}{5}$ and $\frac{3}{4}$, and on the hind pair at $\frac{1}{2}$ and $\frac{3}{4}$ of the distance from base to apex of femora; knees narrowly brown; tibiæ with the apex dark brown, middle tibiæ with a distinct brown spot in the middle of the upper side (this is only faintly visible on the other legs); tarsi light greyish ochreous, tips of first four joints light brown, whole of last joint blackish. *Wings* subhyaline, ochreous-tinged; distinct blackish spots on the small cross-vein, the two outer angles of the discal cell, the junction of the great cross-vein with the fifth longitudinal, and before the apex of the seventh; terminations of all the veins slightly clouded with fuscous. Great cross-vein just before middle of discal cell. Seventh vein with its tip bent downwards at right angles to the main portion, a stump arising from the angle, which is nearly as long as the terminal portion of the vein. *Halteres* uniformly ochreous. *Abdomen* dark greyish ochreous, all the segments with narrow brown apical bands. There is a continuous median longitudinal brown band, which looks as though it were due to the presence of food in the gut. Genitalia with the upper lobes longer than the lower.

Length of body 6 mm.; wing 4·5 mm.

*Hab.* Weligama, 9. ii. 1908, 1 ♂ (*T. Bainbrigge Fletcher*).

7. *Trentepohlia trentepohlii,* Wied. Aussereur zweifl. Ins. i. 551. 18.

Weligama; Galle (*T. Bainbrigge Fletcher*); Tamblejam (*Lt.-Col. Yerbury*).

8. *Trentepohlia* (*Mongoma*) *pennipes,* O.-S. Berl. ent. Z. 1887, p. 204.

Trincomali (*Lt.-Col. Yerbury*); Pundaluoya (*E. E. Green*).

Although Bigot, in 1854, gave no satisfactory definition of *Trentepohlia,* he clearly indicated the type as *Limnobia trentepohlii,* Wied., and consequently his name cannot be rejected. *Mongoma,* Westw., was not published until 1881, but it will be useful to retain this latter name as a subgenus, including those species with four posterior cells, *Trentepohlia* in this restricted sense having only three. The two sections are closely allied, and no doubt are best included under one genus. I have compared balsam preparations of the genitalia of these two Ceylon species, and they are very

similar indeed. *T. pennipes*, O.-S., is said to have two spines near the base of the front femora; specimens which I have examined from the Seychelles Is. show two long and three or four short spines or bristles in this position. *T. exornata*, Bergr., and a closely allied species from W. Africa, have about eight small short spines on the underside of the front femora near the base. This, again, indicates that we are here dealing with only one genus. There are several undescribed African species of this genus in the British Museum.

9. *Conosia irrorata*, Wied. Aussereur. zweifl. Ins. i. 574. 3.

Dondra; Galle; Bentota (*T. B. Fletcher*).

10. *Eriocera crystalloptera*, O.-S. Berl. ent. Z. 1887, p. 222.

Madulsima (*T. B. Fletcher*); Pundaluoya (*E. E. Green*); Haputale (*Lt.-Col. Yerbury*).

The female is larger than the male, but otherwise very similar.

11. *Eriocera humberti*, O.-S. Berl. ent. Z. 1887, p. 221.

Pundaluoya (*E. E. Green*), 2 ♀.

A specimen without an abdomen from Uva P. Madulsima (*T. B. Fletcher*) has the thorax entirely velvet-black, but otherwise agrees with *E. humberti*, of which it may be the undescribed male.

12. *Eriocera ctenophoroides*, sp. n., ♂ ♀.

Rufa, abdomine nigro nitido; pedibus brunneis; alis fuscis, maculis tribus albis apicalibus.

*Head* black, with a black pubescence. Antennæ 8-jointed in both sexes, but the last four joints indistinctly separated; scape dark fuscous, flagellum ochreous brown. Palpi blackish. *Thorax* entirely brick-red, velvety in appearance, except for a line round and just below the mesonotum, which is shining and translucent. Post-alar calli and protuberance below root of wing with tufts of black hairs. *Legs* uniformly dark brown, except for the red coxæ; densely covered with somewhat accumbent black pubescence; stout and shorter than usual in *Eriocera*, giving the insect a very *Ctenophora*-like appearance, which is heightened by the form and colour of the abdomen. *Wings* dark brown, lighter towards the anal margin and in the centre of some

of the cells; a small, long and narrow, more or less crescent-shaped spot in the outer marginal cell, a very small triangular spot in the first submarginal, and a large semicircular spot in the outer portion of the second submarginal and first posterior, white, all reaching the wing-margin.

There are some very interesting features in the neuration: the uppermost of the three veins proceeding from the discal cell is curved downwards, in the type male to such an extent that the second posterior cell is completely closed at its apex; in the type female the small cross-vein is absent, the first basal cell being open. I have not met with either of these variations in any other Tipulid. *Halteres* brown, knob somewhat darker, stalk hairy. *Abdomen* deep black, except the first segment and the ovipositor, which are reddish; for the most part brilliantly shining, but there are apical velvety bands on segments 2–6, these are broadest on segments 2–4, and broader in the female than in the male. Venter entirely dull. The abdomen is much broader in the middle.

*Variety.* One female has the thorax entirely velvet-black and the legs darker.

Length of body 16 mm. (without ovipositor); wing 15 mm.; legs 27–28 mm.

This species is allied to *E. selene*, O.-S., and *E. albonotata*, Lw. From the former it differs in its larger size and in the absence of the central lunule of the wings.

*Hab.* Kandy, 19. v. 92 (type ♂); Kottawa, 24. iv. 92 (type ♀); Pallamadulla, 17. vi. 92 (1 ♀) (*Lt.-Col. Yerbury*).

13. *Eriocera albonotata*, Lw. Ber. d. Berlin. Akad. p. 658 (as *Limnobia*).

Kandy; Pallamadulla; Passara; Trincomali (*Lt.-Col. Yerbury*); Pundaluoya (*E. E. Green*); Diajatalawa (*T. B. Fletcher*).

This species apparently has its nearest ally in the preceeding, the wing-markings of some specimens being identical. It seems to be very common and very variable. In one variety the abdomen is entirely dark; in another there are no dark tips to the tibiæ. The thorax and the last three abdominal segments are sometimes black, sometimes brown, and the white spots at the tip of the wings are in one form very much smaller.

14. *Eriocera scutellata*, sp. n., ♂ ♀.

Flava, thorace nigro trivittato, scutello flavo, alis brunneis non maculatis; fronte bituberculata.

*Head* orange, darker brown behind the eyes, dark-haired. Front with two prominent tubercles. Scape of antennæ dark brown; flagellum ochreous, blackish towards the tip. *Thorax* ferruginous orange; mesonotum with three longitudinal black-brown stripes; the median one is narrowed behind and extends almost back to the suture, where it is seen to be double; the lateral stripes broaden out behind the suture and extend as far as the scutellum. Scutellum orange-yellow. Metanotum dark brown. *Legs*: femora ochreous with blackish tips; tibiæ and tarsi blackish, tibiæ more ochreous towards the base. *Wings* a uniform ochreous brown. In the female the discal cell of one wing is open. *Halteres* brownish. *Abdomen* in male deep orange, first segment brown, segments 2–4 with black lateral borders, segments 5–7 all black except for a narrow apical orange border; in female lighter orange with a black lateral line.

Length of body, ♂ 18 mm., ♀ 15 mm.; wing, ♂ 24 mm., ♀ 16 mm.

*Hab.* Pundaluoya, 1 ♂, Sept. 1892, and 1 ♀, Oct. 1897 (*E. E. Green*).

There is little doubt that the two specimens belong to the same species, though they differ in the colour of the abdomen and the length of the wing.

### 15. *Eriocera tuberculifera*, sp. n.

Lutea, thorace antice flavo, postice fusco; alis brunneis non maculatis; pedibus luteis; fronte trituberculata.

*Head* orange-yellow. Front with a pair of very prominent tubercles just above the antennæ, and above these with a smaller median tubercle. Antennæ with the basal half ochreous yellow, the apical half dark fuscous. *Thorax* fuscous brown; mesonotum yellow in front, the yellow colour not extending as far back as the suture. *Legs* uniform ochreous. *Wings* uniform ochreous brown, very like those of the preceding species. *Halteres* dark fuscous. *Abdomen* orange ochreous, with a dark lateral line.

Length of body 14–17 mm. (without ovipositor); wing 14–17 mm.

*Hab.* Pundaluoya, type ♀, Nov. 1888, one other ♀, July 1889 (*E. E. Green*).

### 16. *Eriocera fusca*, sp. n.

Fusca, pedibus subcyaneis, alis non maculatis.

Head, thorax, and abdomen nearly uniform dingy fuscous.

Front rather produced, but not bituberculated. *Legs* dark fuscous, with submetallic bluish reflections in some lights. *Wings* uniform fuscous. Neuration, as usual in this genus, is rather variable: in the type male there is a supernumerary cross-vein in the second posterior cell, which in the right wing is bifurcated, so that the left wing has two discal cells and the right wing three. The antennæ are tinged with ochreous, and there are indications of two paler stripes on the thorax alternating with three dark ones.

Length of body 10–13 mm.; wing 8–11 mm.

*Hab.* Pundaluoya, April 1889, type ♂ and ♀ and two other males (*E. E. Green*).

This species seems to be most closely allied to *E. morosa*, O.-S., from which it differs (judging from Osten-Sacken's description) in the less intense black colour, in the bluish reflections on the legs, and in the shape of the discal cell; the third posterior cell is here, as usual, longer than the second.

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## X.—*On the Culicid Genus* Eretmapodites, *Theobald.*

By F. W. Edwards, B.A.

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The object of this paper is to clear up certain points of synonymy in the genus *Eretmapodites* without entering into any discussion of the generic position. The species certainly form a well-marked group, and can be treated of as such, whether or not the group be worthy of generic rank. I may, however, point out that there is very little to separate this genus from *Desvoidya*.

A certain amount of confusion appears to have arisen between the two species described by Mr. Theobald, *E. quinquevittatus* (Mon. Culicid. i. p. 280, 1901) and *E. austenii* (Mon. Culicid. v. p. 572, 1910). Mr. E. E. Austen, of the British Museum, had placed the following note under the series of *E. quinquevittatus*:—

> "N.B.—It appears to me that the four specimens from Wilberforce, Freetown (E. E. Austen), in the top row above are *specifically distinct* from the three from the same locality in the next row. The latter belong to the following species [*E. austenii*], which is distinguished by the marking of the dorsum of the thorax,

and the more noticeable enlargement of the tip of the hind tibiæ in the ♂. In the typical *E. quinquevittatus* the thorax is not conspicuously striped at all.—E. E. Austen, 22. xii. 04."

To this Mr. C. S. Banks (of the Bureau of Science, Manila), who visited the Museum some three years ago, added the following :—

"I quite agree with Mr. Austen regarding the absence of special (quinquevittæ) markings in the ♂ or ♀ type of *E. quinquevittata* and believe that Theobald must have mixed his specimens after describing and before labelling them. C. S. Banks. 9. ix. 08."

On the suggestion of Mr. G. A. K. Marshall I have gone carefully into the matter, examining critically every specimen of the genus (seventy-three altogether) in the British Museum. As a result I have come to a somewhat different conclusion from that of Banks. The results of my examination may be set forth as follows :—

(1) Theobald's *description* of *E. quinquevittatus* applies to the male of one species and the female of another.

(2) The insect described by Theobald as *E. quinquevittatus* ♀ was redescribed by him, together with its true ♂, as *E. austenii*.

(3) The insect Theobald described as *E. quinquevittatus* ♂ was redescribed by Graham, together with its true ♀, as *E. chrysogaster*.

Were this all, the riddle would be comparatively simple. But the female insect labelled "*E. quinquevittatus* type" is of the same species as the male type, and agrees with the description of *chrysogaster*, but not of *quinquevittatus*. Thus Banks's conclusion was in the main correct. It looks as though Theobald drew up his first description before he recognized that he had two species before him, and so was not sufficiently careful in choosing his types. The best course seems to me to be to ignore the type label and follow the description, in which case the two species will have to be known as *quinquevittatus* (with a striped thorax and simple hind tarsi in the male) and *chrysogaster* (with unstriped thorax and feathered hind tarsi in the male).

A scrutiny of the series of *E. melanopous**, Graham, showed that here also two species, if not three, had been confused.

* I have not felt myself justified in Latinizing the spelling of Dr. Graham's names.

One or two specimens are undoubtedly *E. chrysogaster*, while two males do not agree with the description of the male of any known species, and are therefore described below. The majority of the specimens forming the series seemed, however, to agree closely with the description of *E. inornatus*, Newstead, and I therefore wrote to Mr. Newstead, who very kindly presented to the Museum a pair of *E. inornatus* from the original Congo series. A comparison of Graham's series with the specimens received from Mr. Newstead shows that *E. melanopous*, Graham, is undoubtedly a synonym of *E. inornatus*, Newstead. Dr. Graham's description was made before Mr. Newstead's, but was not published till two years later. A single specimen of this species taken by Major F. Smith at Sierra Leone was in the series of *E. quinquevittatus*.

I at first believed that Giles's *Uranotænia nitidiventer* (which, as stated by Banks and Carter, is synonymous with his *Runchomyia philippinensis*) should be placed in this genus, owing to the close similarity in scale-structure and colouring. A more careful examination, however, showed that this species is a *Phoniomyia*, and is, in fact, Theobald's *P. bimaculipes*. The name *nitidiventer* will have to supplant *bimaculipes*. In this species, as in several others of the genus *Phoniomyia*, there appear to be no hairs on the metanotum. Giles evidently allowed his imagination to have free play in describing this insect, as it is clear from his types that what he called the "frontal protuberance" is the structure which is present in all mosquitoes and is called by Theobald the clypeus; the prothoracic lobes, too, are of perfectly normal form. Unfortunately no male is known.

The golden-yellow coloration of the venter in *Eretmapodites* would seem to be a good generic character, though it has sometimes been overlooked by previous writers owing to the fact that when the abdomen is not distended with food the venter is hidden and the sides seem to meet in the mid-ventral line. Consequently some species have been described as having the venter banded with black and silver; this is not the case, as both sexes of every species have a golden-yellow venter. Sometimes the venter is completely enfolded except at the extreme base, and then it is very difficult, without reference to other specimens, to make out what has happened.

The *larvæ* of two species are known. Dr. A. C. Connal bred a series of *E. inornatus* from larvæ found at Lagos in the shell of a large land-snail. *E. chrysogaster* was bred in numbers by Dr. A. D. Fraser from larvæ found in an empty lemon-skin at Kasala Forest, Mpumu, Uganda.

Dr. A. Ingram has also bred *E. chrysogaster*, and sent (23. iii. 1909) the following notes from Ashanti :—

"*Notes relative to* Eretmapodites chrysogaster, *Graham*.

"*Ova* appear to be laid singly like *Stegomyia* ova, often not actually upon the surface of the water, but on the side of the vessel almost in contact with the surface of the water. *Larvæ* are long and worm-like, bear some resemblance to the larvæ of *Stegomyia*, having a short syphon-tube hanging almost perpendicular to the surface of the water when at rest, and moving with a lashing worm-like motion when disturbed. The most marked characteristic of the larva, however, appears to be the length of time it can spend browsing at the bottom of the vessel; lying horizontally and crawling about like a worm, it can remain 'below' for longer periods of time than any other *Culex* larva I have seen.

"*Pupæ* are very active when disturbed, but, like the larvæ, spend much time at the bottom of the vessel, 'sitting' in a characteristic attitude upon their tails and swaying gently backwards and forwards.

"*E. chrysogaster*, like *Stegomyia*, is a 'house' mosquito; the ova are laid in small collections of stagnant water in tins, calabashes, &c. The eggs are never very numerous, less so than those of *Stegomyia*; at least *Stegomyia* and *Eretmapodites* larvæ are frequently associated together in small collections of water, and the former are always in the majority.

"I have never known *E. chrysogaster* to 'bite.'"

"Akrokerri, Ashanti,
5/3/09."

*Brief Diagnoses of the Species.*

1. *E. quinquevittatus*, Theob. — Prothoracic lobes silvery-scaled. Mesothorax golden-scaled, with five sharply-defined lines of black scales; when denuded pale ochreous brown. Hind tarsi of male simple.

2. *E. condei*, Ventrillon *.—Prothoracic lobes with flat silvery scales. Mesothorax golden-scaled, with two longitudinal lines and a continuous marginal line black; when denuded pale ochreous brown. Hind tarsi of male simple.

I can see nothing to separate this species from

* 'Archives de Parasitologie,' ix. 1905, p. 444.

*E. quinquevittatus*, but as the specimens in the British Museum are all rubbed, I refrain from sinking the name as a synonym. The only difference that is apparent from the description is the absence of the median black line on the thorax; the original specimens may have been in bad condition.

3. *E. inornatus*, Newstead.—Prothoracic lobes with flat silvery scales. Mesothorax mainly dark-scaled, with an anterior submedian pair; a lateral pair and a median posterior golden line. Colour of chitin dark brown. Male with simple hind tarsi; the penultimate segment of abdomen with lateral silvery spots; claspers of genitalia with dark scales.

4. *E. grahami*, sp. n., ♂.—Prothoracic lobes with flat silvery scales. Mesothorax mainly dark-scaled, with scattered yellow scales, but without distinct markings, chitin dark brown. Hind tarsi simple. Penultimate segment of abdomen with lateral silvery spots; claspers of genitalia with light scales.—Described from a male from Obuasi, Ashanti, 8. viii. 1907 (*Dr. W. M. Graham*): type, and one other specimen from same locality, taken 13. xi. 1907, in British Museum (Natural History).

Since no females are yet available for examination, it is impossible to give characters applicable to both sexes; the study of further material may, indeed, prove that *E. grahami* is only a form of the following species. Dr. Graham has examined these two specimens, and agrees that they are apparently distinct from any previously described species.

5. *E. chrysogaster*, Graham.—Prothoracic lobes with flat silvery scales. Thorax without distinct markings, chitin variable in colour, from rather light brown to almost black. Hind tarsi of male feathered, but the amount of scaling varies somewhat. Penultimate segment of abdomen *usually* with a continuous silvery band across the dorsum; claspers of genitalia with light scales.

As in all other species belonging to the present genus, there is a variable number of yellow upright scales on the head mixed with the black ones; this character cannot therefore be used, as it was by Newstead, for the separation of *E. inornatus* and *E. chrysogaster*.

6. *E. leucopous*, Graham.—Prothoracic lobes with narrow-curved yellow scales. Thorax with rather obscure dark

stripes, chitin dark brown. Last two joints of hind tarsi white in both sexes. Claspers of ♂ genitalia hardly scaly.

7. *E. oidipodeios*, Graham.—Prothoracic lobes with narrow-curved yellow scales. Thoracic markings somewhat like those of *E. inornatus*, but the yellow markings more extended and not sharply defined. Hind tarsi of ♂ bent, with a tuft of long hair. Claspers of genitalia hardly scaly.

*Table for determining the Species of* Eretmapodites.

| | | |
|---|---|---|
| 1. | Prothoracic lobes covered with flat silvery scales .. | 2. |
| | Prothoracic lobes entirely without flat silvery scales. | 6. |
| 2. | Hind tarsi of male simple ..... | 3. |
| | Hind tarsi of male feathered; thorax without distinct markings ..... | *chrysogaster*. |
| 3. | Thorax without distinct markings..... | *grahami*. |
| | Thorax distinctly striped ..... | 4. |
| 4. | Thorax light-coloured, with distinct black stripes .. | 5. |
| | Thorax dark-coloured, with narrow golden stripes .. | *inornatus*. |
| 5. | A median black longitudinal stripe on thorax..... | *quinquevittatus*. |
| | No median black longitudinal stripe on thorax .... | *condei*. |
| 6. | Last two joints of hind tarsi white; hind tarsi in ♂ simple..... | *leucopous*. |
| | Last two joints of hind tarsi not white; hind tarsi in ♂ tufted ..... | *oidipodeios*. |

*Summary of Synonymy.*

1. *E. quinquevittatus*, Theob.

   *quinquevittatus*, Theob., ♀.
   *austenii*, Theob.

2. *E. condei*, Ventrillon.

   ? præc. var.

3. *E. inornatus*, Newstead.

   *melanopous*, Graham.

4. *E. grahami*, sp. n.

   ? *chrysogaster*, Graham, var.

5. *E. chrysogaster*, Graham.

   *quinquevittatus*, Theob., ♂.

6. *E. leucopous*, Graham.

7. *E. oidipodeios*, Graham.

*Geographical Distribution of the Species.*

*E. quinquevittatus.* — Sierra Leone; Ashanti (Obuasi); S. Nigeria (Oshogbo, *Dr. T. F. G. Mayer*; Ilesha, *Capt. L. E. H. Humfrey*).

*E. condei.*—Madagascar.

*E. inornatus.*—Sierra Leone; Ashanti (Obuasi); S. Nigeria (Ilesha, *Capt. Humfrey*; Lagos, *Dr. Connal*); Congo Free State (Coquilhatville and Lusambo).

*E. grahami.*—Ashanti (Obuasi).

*E. chrysogaster.*—Sierra Leone; Ashanti (Obuasi and Akrokerri); Uganda (Kampala Swamp, Kasala, Mpumu, and Buanuka, *Dr. A. D. Fraser*).

*E. leucopous* and *E. oidipodeois.*—Ashanti (Obuasi).

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## XI.—*On new Species of* Histeridæ *and Notices of others.*

By G. Lewis, F.L.S.

This is the thirty-seventh paper on the Histeridæ; the last was published in July 1910.

Linné (in 1735), Paykull (1811), Marseul (1853), and other writers have noticed varieties of many species, but they abstained from giving them varietal names. It is different now, and I think that if the present plan of procedure is continued systematists will year by year be more and more discredited. Last year four names were added to those of *Hister maculatus*, L., bringing the number up to nineteen. The colour-varieties of *H. maculatus* are very numerous, and names founded on them might easily be brought up to thirty; but would this be useful for a study of the species? The volume of the Catalogue would be enlarged, but would the enlargement be serviceable, and should the limit be 30? *Saprinus varians*, Sch., has but one name at present, but, as its name implies, it is very variable; is it desirable to give it six or eight more names? And this question may be asked of a large number of species. *Gnathoncus rotundatus*, Kug., has twenty names, and *Saprinus nitidulus*, F., sixteen.

In a time that we may anticipate but shall not see, 100,000 more Coleoptera will probably be described, and these at a moderate computation will acquire 150,000 to 180,000 names. In the Munich Catalogue (1868) 803 species of Cicindelidæ

have 1378 names. In the Berlin Catalogue of last year for 2420 species of Histeridæ there are 2940 names.

Mr. F. Muir has been several years (1907–1910) in Eastern Asia seeking for creatures that check the ravages of the sugar-cane weevil, *Sphenophorus*, and he discovered that *Plæsius javanus*, Er., fed, both in the larval and adult stages, on species of this genus, and that in Amboina and Ceram *Platylister abruptus*, Er., fed mostly on the larvæ of a *Sphenophorus* which infests the sago-palms. Mr. Muir consequently imported into the Hawaiian Islands the two Histerids, liberating at Honolulu about 50 specimens of the *Plæsius* and 250 of the *Platylister*, in the hope that they may prey on the weevil which is injurious to the sugar-cane there. The *Plæsius* has not been seen since its liberation, but the *Platylister* has been found twice. *Sphenophorus* occurs in Asia as far north as South Japan, and lately a species of *Platylister* has been found in Kiushiu and Formosa and another in South China. Neither of these districts has yet yielded the *Plæsius*. It is not probable that the Histerids feed solely on these particular weevils, but the vegetation which attracts the one affords at the same time convenient shelter to the other when not actively engaged in seeking for food.

As regards the Histeridæ generally, no adequate collection of the species has yet been made, and their systematic classification, as far as a satisfactory lineal arrangement of the genera can be effected, has not been reached.

### *List of Species.*

Hololepta insignis, *Sch.*
Trypanæus torpedo, *Lew.*
—— lævipennis.
Coptotrophis trunculus.
Trypeticus crassus, *Sch.*
*bifoveolatus*, Lew.
Teretrius prædator.
—— æstivus, *Lew.*
—— mogul.
—— alfierii, *Pic.*
Platylister procerus.
Platysoma viatorium.
Omalodes optatus.
Campylorhabdus (Teinotarsus) poggei, *Har.*
Macrolister curvistrius.
—— latilabris.
—— robusticollis, *Lew.*
Hister paganus, *Sch.*, 1889.
*exlegis*, Lew., 1903.
Hister accola.
—— vadatus, *Lew.*
—— guinensis, *Payk.*
Spilodiscus penulatus.
—— militaris, *Horn.*
Dendrophilus championi, *Lew.*
Pachylomalus leo, *Mars.*
Paromalus javanus, *Redtb.*
Tribalus cavernicola, *Lew.*
Pelorurus feæ, *Lew.*
—— pumicatus.
Microchætes costatus, *Macl.*, 1871.
*Epiechinus tasmani*, Lew., 1899.
Saprinus dives.
—— æquipunctatus, *Horn.*
—— walkeri, *Bickh.*
Hypocaccus asticus.

*Hololepta insignis,* Sch.

Schmidt only knew the female of this species, of which the type is in the Berlin Museum. The male has no carina on the mentum, the thoracic fossette is on the lateral border distant from the angle and similarly placed to that of *sternalis,* Lew., the anterior part of the prosternal keel is greatly widened out, and nearly the whole of this widened portion is excavated, the posterior margin alone remaining, and the tenuous anterior edge has a sinuous outline. The mandibles are very long and widely depressed in the middle. In the Hololeptini a very important masculine character lies in the form of the menton, but a very conspicuous secondary character in some species is the presence or absence of a thoracic fossette or fovea occurring in varying positions in the anterior upper surface of the thorax. It is not a persistent character, as it does not exist in all the species, and in some it varies much in size according to the more or less development of the individuals. The function of the foveæ is not apparent.

*Trypanæus torpedo,* Lewis, 1885.

This species was discovered by Mr. Thomas Belt in Nicaragua, and at the same time specimens of *Tesserocerus belti,* Sh., were found, and as both species are of similar girth, the first is probably predaceous on the second; both species are for their kind very large. The smallest species of *Trypeticus* known is a native of Sumatra and is scarcely larger than a fine thread, and it would be very interesting to discover the wood-borer whose passages are so minute.

*Trypanæus lævipennis,* sp. n.

Cylindricus, robustus, niger, nitidus; fronte plana, rostro apice acute producto; pronoto antice punctato haud tuberculato; elytris lævibus; prosterno brevi triangulato, margine elevato; tibiis anticis 6-dentatis.

L. $6\frac{1}{4}$ mill.

♂. Cylindrical, robust, black and shining; the forehead flattened between the eyes, no ocular tubercle, surface somewhat opaque, rostrum a little swollen laterally, with the apex acutely pointed and the tip a little raised; the thorax margined laterally and anterior area for about one-fifth of the length distinctly punctured, but without tubercles, the remaining surface is finely and sparsely punctulate; the

elytra are almost smooth, the few points being microscopic; the propygidium and pygidium are rather densely punctured, the latter being very obtusely produced; the prosternum, keel is very short, triangular, with its margin, except at the base, elevated, inner surface smooth; the mesosternum and metasternum have a well-marked median channel and are impunctate; the anterior tibiæ have six strong teeth, the intermediate have seven dentations, the two at the tarsal end being joined at their bases.

There is no similar species known to compare with this.

*Hab.* Cachabi to Paramba, N.E. Ecuador (*W. F. H. Rosenberg*).

*Coptotrophis trunculus*, sp. n.

Cylindricus, piceus, nitidus; ♂ fronte leviter impressa 1-tuberculata, rostro apice obtuso reflexo, ♀ fronte circulari concava; pronoto grosse punctato; elytris tenuissime puncticulatis; pygidio dense punctato; prosterno marginato; mesosterno utrinque sulcato; tibiis anticis 6-dentatis.

L. $2\frac{1}{4}$ mill.

Cylindrical, piceous, shining, elytra, legs, and antennæ obscurely brown; ♂ forehead lightly impressed with a small median tubercle, ♀ with a circular concavity, surface microscopically strigose and sparingly punctured; the thorax, anterior angles reddish, ♂ slightly impressed anteriorly, ♀ more slightly, surface very distinctly punctate, some points large, others smaller, and there is a narrow median line almost impunctate; the elytra are brown and very feebly punctured; the pygidium (in both sexes) is convex, densely and somewhat coarsely punctured; the prosternum is strongly margined laterally, but the striæ only obscurely meet anteriorly; the mesosternum has a well-marked lateral sulcus; the metasternum has a median channel which is wide anteriorly and linear behind; the antennæ, scape has a few long flavous hairs; the anterior tibiæ are 6-dentate.

The general facies of this small species closely resembles that of *deyrollei*, Mars., and *proboscideus*, F. Marseul says of *deyrollei* that the mesosternal stria is "not interrupted"; but the three species given above are exactly alike in this respect, and have only a lateral sulcus. The sterna are lightly and vaguely puncticulate. The relatively large size of the thoracic punctures serves to separate *trunculus* from the other two species.

*Hab.* Guatemala.

*Trypeticus crassus*, Sch., 1892.

*Trypeticus bifoveolatus*, Lew., 1893.

Schmidt recorded that the male of this species was in my collection and came from Perak. The specimen referred to is in the British Museum and belonged to the late Mr. Fry's collection. I think now that the deep foveæ in the pygidium of *bifoveolatus* is not a specific character, as I have seen five examples without them, and my name therefore must fall into the synonymy.

*Teretrius prædator*, sp. n.

Cylindricus, niger, nitidus, sat dense punctatus; prosterno punctato, striis parallelis; mesosterno sparse punctato; propygidio pygidioque modice dense punctatis; pedibus brunneo-ferrugineis; tibiis anticis intus ciliatis.

L. $3\frac{1}{4}$ mill.

Cylindrical, black and shining, evenly and somewhat densely punctured above; the forehead convex; the thorax, lateral stria sinuous before the base, continuing, but finer, behind the head; the pygidium is convex, surface microscopically strigose and evenly punctured, punctures not very close; the prosternum rather closely punctured, punctures rather large and shallow; the mesosternum is markedly marginate, and with the metasternum and first abdominal segment (all similarly) sparsely and somewhat finely punctured; the anterior tibiæ are 10–11-dentate, with a few flavous hairs at the tarsal end on the inner edge, intermediate 7–8-, posterior 4–5-spinose.

This species is much less robust than *pilimanus*, Mars., but the surface punctuation is closely similar. Some examples have on the first abdominal segment a lineal arrangement of punctures which correspond to the striæ that I have noticed in *æstivus*.

*Hab.* Senegal and Central Africa. In the Paris Museum and my own collection.

*Teretrius æstivus*, Lew. Ann. & Mag. Nat. Hist. xv. p. 470 (1885).

In the Catalogue of 1905 I placed this name in error as a synonym of *T. punctulatus*, Fähr. The prosternal striæ are not, as I stated, divergent except at the anterior tips, and there is a marked specific character in a lateral longitudinal stria on the first abdominal segment.

*Teretrius mogul*, sp. n.

Cylindricus, robustus, niger, nitidus, undique parum dense punctatus, pedibus piceis; pronoto stria marginali integra; prosterno basi profunde inciso, striis modice divergentibus; mesosterno stria transversa arcuata, tenui impressa; tibiis anticis 10–12-denticulatis.

L. $3\frac{1}{4}$–$3\frac{1}{2}$ mill.

Cylindrical, robust, black and shining, antennæ and legs piceous. Wholly punctured above, very similarly to *kraatzi*, which Marseul calls "sat fortiter et dense punctatus." The marginal stria of the thorax is complete behind the head; the prosternum, the striæ gradually diverge from the base to the apex, sometimes terminating at the suture, sometimes joining the marginal stria along the anterior rim (in one example this variation occurs on one side and not on the other); the mesosternum is prominently produced, but the marginal stria, beginning at the coxæ, does not follow its contour, but is arched and fine, and leaves rather a wide anterior margin, all the sterna and the first abdominal segment are finely and sparingly punctulate. The anterior tibiæ are 10–12-denticulate, intermediate 7–8-, posterior 4–5-spinose.

The peculiar mesosternal stria is a remarkable character which distinguishes it from all the other species I know.

*Hab.* Lahore, associated with *Teretriosoma intrusum*, Mars. (*E. P. Stebbing*).

*Teretrius alfierii*, Pic. Échange, xxvi. p. 9 (1910).

"Large et assez court, presque parallèle, subconvexe, brillant, roux à ponctuation sur le dessus du corps assez forte et écartée; tibias antérieurs très aplatis, creusés et élargis, modérément denticulés, propygidium et pygidium non densément ponctués. Voisin de *acaciæ* Reitt., plus trapu et de coloration plus claire; moins allongé que *pulex* Fairm."

L. 2 mill.

"*Hab.* Egypt à Choubra."

The form given by the author seems to indicate that this species belongs to the genus *Teretriosoma*, but the essential characters of this genus and *Teretrius* lie in the sterna, of which the author says nothing.

*Platylister procerus*, sp. n.

Oblongo-ovatus, subdepressus, niger, nitidus; fronte concava, stria utrinque interrupta, mandibulis in medio impressis; pronoto stria laterali haud interrupta; elytris striis 1–3 integris, 4–5 et suturali brevibus lineis punctatis; pygidio dense punctato, margine postice lævi haud elevato; mesosterno stria marginali obscure integra; tibiis anticis 4–5-dentatis.
L. $8\frac{1}{2}$–9 mill.

Oblong-oval, rather depressed, black and shining; forehead concave, with the stria obsoletely interrupted on either side; labrum transverse, with an arched outline, not emarginate; mandibles rather broad and impressed in the middle; the thorax, lateral stria well marked and continued behind head, scutellar fovea very small; the elytra, 1–3 dorsal striæ complete, 4–5 and sutural fine, apical, punctiform or broken, the sutural is sometimes wanting; the propygidium transversely punctured, punctures irregular and not very close; the pygidium is evenly and rather closely punctate, with the posterior rim smooth but not elevated; the mesosternum is emarginate, and behind the emargination the stria is fine but traceable as complete; the anterior tibiæ are 4–5-dentate.

The dorsal striæ of this species resemble those of *cathayi* and *niponensis*, Lew. It is the largest species of the genus known except *mirabilis*, Lew.

*Hab.* Kouy-Tcheou, province of Central China, east of Yunnan (*Père Cavelerie*, 1908) (? Kwei chau of the 'Times' Atlas). Two examples in the Paris Museum and one in my collection.

*Platysoma viatorium*, sp. n.

Oblongo-ovatum, subdepressum, nigrum, nitidum; fronte punctulata tenuiter impressa, stria integra; elytris striis 1–3 integris, 4–6 abbreviatis; pygidio basi grosse punctato, margine postice late lævi; mesosterno parum late emarginato; tibiis anticis 4-denticulatis.
L. $3\frac{1}{4}$ mill.

Oblong-oval, rather depressed, black and shining; the head finely punctulate, with more conspicuous punctures along the base, frontal stria complete, forehead and clypeus impressed; the thorax finely punctulate laterally, the lateral stria continues anteriorly to behind the eye, where it is slightly disconnected from a straight crenulate stria behind

the head, and which is not so close to the margin; the elytra, dorsal striæ 1–3 complete, 4 shortened before the base, 5 somewhat shorter, sutural almost dimidiate; the propygidium has irregular, shallow, subocellate punctures, chiefly on its sides; the pygidium has large and deep punctures, closely set at the base and apically is margined with a rather wide and smooth, not elevated rim; the anterior tibiæ are 4-denticulate.

The species in size is similar to *P. vicinale*, Lew., but the sculpture of the pygidium distinguishes it from the other known West-African species.

*Hab.* Angola.

*Omalodes optatus*, sp. n.

Ovatus, convexiusculus, niger, nitidus; fronte minute punctulata, in medio modice sulcata; pronoto lateribus dense punctulato, stria marginali ad angulos valida; elytris striis 1 integra, 2 basi abbreviata, apice punctis formata; propygidio utrinque grosse punctato; pygidio transverse punctato, basi et apice lævi; prosterno haud striato; mesosterno utrinque marginato; tibiis anticis 4-dentatis.

L. 10–11 mill.

The above is similar in outline to *O. felix*, Lew.; it is not so oblong as *O. mestino*, Lew., but its size agrees with that Peruvian species. The fine punctuation of the head distinguishes it from *felix*; the scutellar puncture is very distinct; the first dorsal stria is very fine on the apical half and has a few fine punctures, the second is more marked posteriorly but much shortened at the base, and close to the apical edge it consists of three or four points only; the propygidium is almost impunctate on the middle of its disc and the smooth area widens out both before and behind; the pygidium, punctures extend across the disc, leaving the apex and the basal area smooth; the anterior tibiæ are 4-dentate.

*Hab.* Alto Parana, Argentina (*Bertoni*).

*Campylorhabdus* (*Teinotarsus*) *poggei*, Har., 1879.

Harold's diagnosis of this species is:—

"Ater, subnitidus, thorace dense punctulato, ad latera striolato, elytris fortius et denso subrugoso punctatis, stria humerali et dorsalibus septem extus carinatis, interioribus antice abbreviatis, stria suturali antice abbreviata; prosterno antice lobato-producto, lobo medio emarginato, mesosterno margine antico subrotundato integro, non emarginato."

L. 11·5 mill.

The oblique interstitial elytral stria is obliterated in *poggei* by the rugose sculpture, but it is traceable in *singularis*, Sch., and shows that the inner humeral stria is complete and similar to the stria of those species I have assigned to the genus *Exorhabdus*. The outline of the mesosternum is formed the same in both genera, and they should be placed close together in the Catalogue. The outer humeral stria in *poggei* extends from the base, where it is carinate, to beyond the middle; in *singularis* it is wholly carinate but short, ceasing where in *poggei* it is no longer carinate.

### *Macrolister curvistrius*, sp. n.

Ovatus, convexus, niger, nitidus; labro excavato, emarginato, stria frontali integra tenuiter impressa; pronoto stria interna haud interrupta; elytris striis 1–3 integris, 4 basi abbreviata apice conspicue sinuata, 5 et suturali obsoletis; propygidio punctulato, margine postico in medio lævi; pygidio dense punctato; prosterno haud striato; mesosterno stria marginali interrupta; tibiis anticis 3-dentatis.
L. 12–13 mill.

This species is very similar to *latipes*, Palis. Beauv., but the labrum is rather less wide, the inner thoracic stria is complete, not interrupted behind the head, and the outer stria quite reaches the base, the elytral fourth stria is not punctiform, but shortened by about one-third at the base, and posteriorly it is markedly sinuous, the propygidium is much more clearly punctured, with a median smooth space on the posterior border; the sterna are similar to those of *latipes*. The thoracic stria being complete is of importance, as the other known species placed in the first section of the genus (in which the mesosternal stria is interrupted) have this stria interrupted. In one specimen I have seen the labrum is impressed, not excavated, and in others the short apical dorsal striæ are punctiform.

*Hab.* Belgian Congo. Examples in the Musée du Congo Belge and my own cabinet.

### *Macrolister latilabris*, sp. n.

Ovatus, convexiusculus, niger, nitidus; fronte stria integra, labro lato modice inciso; pronoto fulvo ciliato, striis lateralibus pone oculos interruptis; elytris striis 1–3 integris, 4 abbreviata, 5 brevi punctiformi; pygidio vix dense punctulato; mesosterno stria marginali late interrupta; tibiis anticis 3-dentatis.
L. 14 mill.

This species has little to separate it from *Hister major*, L., except its size, greater breadth, and less convexity, and the labrum (a very important character) is narrower and one-third wider. I have a specimen which is apparently the same species as the above; it is labelled "*medius* Sturm Ind. or." This is a catalogue name which appears in the Munich Catalogue under *Hister bengalensis*, Wiedem. My specimen probably belonged to Sturm, and if so, the locality given by him is almost certainly an error.

*Hab.* Senegal. Four examples.

*Macrolister robusticollis*, Lew.

I have one example of this species from Johannesburg which measures 12 mm., but most of my specimens approximately measure 9 mm., the size of the type example.

*Hister exlegis*, Lew., 1903.

=*paganus*, Sch. 1889, n. syn.

Formerly I considered that Schmidt's description did not apply to my species, because he stated that in *paganus* the inner subhumeral stria was complete, but the stria terminates in the middle, the oblique basal stria is very distinct but it does not join it. In the species I have assigned to the genus *Exorhabdus* the inner subhumeral stria is complete and similar to the first dorsal stria, and the oblique stria is faint, but it is traceable in the interstice between the first dorsal and the subhumeral striæ; it is not wholly obliterated. Schmidt made a similar statement regarding *Hister aschanti*, the subhumeral just passes beyond the middle only, the stria at the base is the oblique stria and is extremely fine, and although it joins the subhumeral it is very distinct.

*Hister accola*, sp. n.

Breviter ovatus, parum convexus, niger, nitidus; fronte stria antice recta; pronoto stria interna integra, externa ultra medium abbreviata; elytris striis subhumerali interna ante medium abbreviata, dorsalibus profundis, crenulatis, 1–4 integris, 5 apicali, suturali basi abbreviata; propygidio pygidioque vix dense punctatis; mesosterno fere recto, marginato; pedibus piceis; tibiis anticis 3-dentatis.

This species belongs to the series of African species which have a short outer thoracic stria and a bowed sutural stria

more or less complete. As such it is similar to *H. torridus*, Mars., but it differs by the dorsal striæ being deeper and crenulate, by the pygidia being evenly and almost densely punctured (the pygidium having a grade of punctures slightly smaller), and by the mesosternal edge being almost straight and only very feebly sinuous.

*Hab.* Belgian Congo. In the Museum of the Belgian Congo and in my own collection.

*Hister vadatus*, Lewis, 1908.

Ovalis, convexus, niger, nitidus; fronte stria antice recta; pronoto bistriato; elytris striis 1–4 integris, 5 obsoleta, suturali utrinque abbreviata; propygidio pygidioque punctatis; mesosterno stria marginali in medio interrupta; tibiis anticis 3-dentatis, apicali dente immani.
L. 7 mill.

Oval, convex, black and shining; the head, frontal stria complete, straight anteriorly and rounded off on either side; the thorax, marginal stria very fine, two lateral well-marked and parallel to each other, the outer stria terminates behind the eye, inner continued behind the head; the elytra, humeral stria wanting, dorsal 1–4 complete, 5 indicated by a few apical points, sutural abbreviated at both ends, the ends turn away from the suture; the pygidia are clearly not closely punctured with microscopical points in the interspaces; the prosternum, lobe marginate and impunctate; the mesosternum is feebly sinuous anteriorly and the marginal stria is interrupted in the middle; the anterior tibiæ 3-dentate, apical tooth very large.

The above is similar to *H. obesus*, Fåhr., and others by the thorax being bistriate laterally and the terminal tooth of the anterior tibia being very large.

*Hab.* Meru: at the river Ngare na nyuki, 22nd Nov., 1905.

*Hister guinensis*, Payk. Mon. 1811.

In reference to my note, Ann. & Mag. N. Hist. vi. p. 54 (1910), Prof. Sjöstedt informs me that there is no specimen to represent Paykull's species in the Stockholm Museum; the name is there, but no pin-hole near it. I think therefore my sternal characters may be taken as belonging to *guinensis*. This year is the centenary of the publication of Paykull's Monograph, the first on the family and treating of 93 species.

*Spilodiscus penulatus*, sp. n.

Ovalis, convexus, niger, nitidus; fronte stria integra antice sinuata; pronoto striis 2 lateralibus integris haud parallelis; elytris maculis flavo-rubris, arcuatis, striis 1–3 integris, 4–5 apicalibus, suturali basi abbreviata; mesosterno valde emarginato, stria marginali integra.

L. $3\frac{2}{3}$ mill.

Oval, convex, black and shining, frontal stria well marked and sinuous anteriorly; the thorax with two lateral striæ, strong and widest apart behind the anterior angle, inner stria continued behind the head and is sinuous behind the eyes, marginal stria fine and not continued behind the neck; the elytra, humeral striæ wanting, except the short oblique stria, dorsal 1–3 complete, 4–5 short and apical, 4 with basal appendage, sutural shortened about one-fourth from the base, the red marking is arcuate in outline and very similar to that figured for *patagiatus*, Lew. Biol. Centr.-Am., Col. vol. ii. pt. 1, tab. v. fig. 13, except that the interstice between the first and second striæ is only red for a short space before the base; the pygidia are evenly but not quite densely punctured; the mesosternum is deeply emarginate and the striæ well-marked and complete; the anterior tibiæ are dilated.

*Hab.* Nogales, St. Crus Co., Arizona (*F. W. Nunenmascher*).

*Spilodiscus militaris*, Horn, 1870.

I have five specimens of this species; one of them is entirely black.

*Dendrophilus championi*, Lewis, 1886.

Bickhardt considers the above to be a variety of *punctatus*, Herbst—that is, that it is not specifically distinct. I think that the form of the dorsal striæ and the structure of the sternal plates are sufficient to class it as a species distinctively different. There is no question of the existence of the differences, but Bickhardt doubts their specific validity. I have only three examples, but I have seen others and there are two specimens in the British Museum.

Bickhardt has similar ideas regarding genera; in his Catalogue he sinks 47 genera, calling them subgenera. I think the name of a genus unused should be placed in the synonymy. The late Mr. A. Matthews (Ann. & Mag. N. Hist. p. 443, June 1892) says: "genera are at the best mere

arbitrary divisions, depending on the peculiar ideas of individual authors." So here, again, Herr Bickhardt and I may each retain our own.

In the Berlin Catalogue *Xenonychus,* Woll., is set aside for *Styphrus,* which, I think, has no status at all; but *Merohister,* Reitter, is admitted as a "subgenus," although the name of *Pactolinus* has a similar relation to it that *Styphrus* has to *Xenonychus.*

Bickhardt also considers *Saprinus immundus,* Gyl.= *æneus,* F.; Reitter in the 'Fauna Germanica,' 1910, correctly separates them.

*Pachylomalus leo,* Mars.

The type of this species is in the Genoa Museum and is apparently a male, because Marseul tells us that the first segment of the abdomen is elevated in the middle of the posterior border, and this is a masculine character. Had he been describing the male of *tuberosus,* Lew., he could not have overlooked the conspicuous tubercles on the propygidium; he simply says that it is smooth and a little convex. *P. tuberosus* in the Berlin Catalogue stands as a synonym of *victor,* Mars., a species which is smaller and has no marginal stria on the mesosternum. The three species named come from Java, Sumatra, and Borneo respectively. I have also a species very similar in size to *tuberosus* from Sumatra, in which the prosternal striæ distinctly meet at both ends and there are no lateral striæ on the mesosternum; the specimen is a female.

*Paromalus javanus,* Redtenbacher, Reis. Novar., Zool. p. 33 (1867)

"Oblongo-ovatus, subconvexus, subtilissime vage punctulatus, niger, nitidus; antennis ferrugineis; thorace stria marginali antice integra; elytris striis nullis; prosterno bistriato; mesosterno stria bisinuata.

"Long. 2‴, latit. $4\frac{1}{5}$‴."

The species is said to be larger and shorter than *P. complanatus,* Panz., and I think that it is a *Paromalus.* Dr. Redtenbacher's measurements are incorrect, and my reading of the diagnosis is that the mesosternal stria is complete (being described as bisinuous), and the species cannot therefore be referred to *Paromalus schultheissi,* Sch., a very common Javan species, and which has the mesosternal stria widely interrupted.

*Tribalus cavernicola*, Lewis, 1908.

Ovalis, supra subdepressus, subæneus, nitidus; fronte concava, supra oculos elevata, fere lævis; pronoto basi transversim impresso; elytris striis obsoletis; prosterno striis utrinque divergentibus; antennis pedibusque obscure brunneis.
L. 3 mill.

Oval, somewhat depressed above, brassy, shining; the head, concave anteriorly with lateral margins elevated, surface almost impunctate; the thorax is evenly, finely, and rather closely punctulate, marginal stria complete, along the middle of the basal edge there is a narrow transverse rugose impression; the elytra, dorsal striæ short, oblique, and ill-defined, disc and the pygidia are almost smooth; the prosternum, lobe marginate, clearly punctured and microscopically strigose, striæ divergent before and behind, keel lightly sculptured; the mesosternum, marginal stria very fine and interrupted in the middle, evenly, sparingly, and very minutely punctulate, transverse stria well-marked with sixteen crenellations; the antennæ pale brown, legs obscurely brownish.

Similar in form and colour to *T. capensis*, Payk., but the surface sculpture of Paykull's species is densely punctulate.

*Hab.* Usambara; Tanga, in the Mkulumusi caves.

*Pelorurus fecæ*, Lewis, 1906.

Breviter ovalis, nigro-cupreus, nitidus; elytris viridi-cæruleis; fronte obscure punctulata, antice impressa; pronoto lateribus punctato; elytris striis profundis, 1–3 geminatis integris, 4 suturaliquo integris simplicibus; prosterno striis lateribus interruptis et inter coxas minute foveolato; tibiis anticis denticulatis.
L. $4\frac{1}{4}$–$4\frac{1}{2}$ mill.

Shortly oval, almost black beneath, thorax coppery, elytra greenish blue; the head impressed behind the clypeus, surface finely punctulate with a lateral stria; the thorax, marginal stria complete, punctured laterally, basal edge punctured, especially opposite the second, third, and fourth striæ; the elytra, striæ deep and strong and somewhat punctate, 1–3 complete and double, 4 complete but single, also the sutural, in one example of three there is a short apical oblique fifth stria; the propygidium is finely and on the disc and base very sparingly punctured; the pygidium is compressed, except at the base, which is impunctate and like that of *P. cregoei*, Lew., is on the same plane as the propygidium; the prosternum, the striæ are broken at the

coxæ, near which, on either side, is a small but distinct puncture or fovea; the mesosternum is marginate and bisinuous.

Resembles *P. formosus*, Sch., and *cregoei*, Lew., but it differs by the fine punctuation of the head, deeper dorsal striæ (which have no specially wide interstice), and by the interrupted prosternal striæ and fovea. *P. formosus* and *cregoei* have the head more distinctly punctured and the sternal striæ are similar in both species.

*Hab.* Bolama, Portuguese Guinea.

*Pelorurus pumicatus*, sp. n.

Breviter ovalis, supra depressus, nigro-cupreus; elytris obscure viridi-cæruleis; fronte tenuiter impressa, leviter punctulata; pronoto lateribus sat fortiter punctato; elytris striis 1–2 geminatis integris, 3–4 posticis geminatis, 5 apicali, suturali integra haud geminata; tibiis anticis denticulatis.

L. 5½ mill.

Shortly oval, somewhat depressed above, thorax coppery, elytra somewhat obscurely greenish blue; the head lightly impressed behind the clypeus, surface very lightly and finely punctulate; the thorax somewhat coarsely punctured laterally, with a line of irregular points at the base before the scutellum; the elytra, inner subhumeral stria is broken or punctiform, and shortened at the base, 1–2 dorsal complete and geminate, 3 geminate only in the posterior half, 4 double, but apical only, 5 is single, short, and apical, with basal puncture as an appendage, sutural single, very slightly shortened at the base and approaches the suture posteriorly; the propygidium is clearly, evenly, and rather densely punctate; the pygidium has a few irregular fine points; the prosternum, the striæ are fine and not very clearly impressed and the marginal stria of the mesosternum is similar; anterior tibiæ denticulate.

The very fine punctulation on the head, the thoracic line of punctures before the scutellum, and the form of the elytral striæ distinguish this species from its congeners.

*Hab.* Harrar, Abyssinia.

*Microchætes costatus*, Macleay, 1871.

Lea states that the above, Trans. Ent. Soc. Lond. p. 145, 1907, is identical with *Epiechinus tasmani*, Lew., 1899. Macleay confused the Histeridæ with the Byrrhidæ, describing one as a *Limnichus* and the above as a *Microchætes*. Macleay's specific name has precedence to mine.

*Saprinus dives*, sp. n.

Ovatus, convexiusculus, æneus, nitidus, elytris violaceis; fronte dense punctata, stria antice interrupta; pronoto antice utrinque impresso; elytris striis 4 et suturali connexis; prosterno striis antice divergentibus arcuatim junctis; mesosterno grosse punctato; metasterno in medio late impresso; tibiis anticis 7–8-denticulatis.

L. 5–6 mill.

Oval, somewhat oblong, thorax brassy, elytra violet or purple, pygidia bluish; the head densely punctured, stria widely interrupted anteriorly, with a small but distinct fovea on the vertex; the thorax narrowly punctured along its base and widely along the sides and behind the head, behind the eyes there is a well-marked impression; the elytra, striæ inner subhumeral dimidiate, being shortened at either end, 1 dorsal reaches the middle, 2, 3, 4 are a little longer, the last joining the sutural which is complete, the interstice between the first and second striæ is strigose and there are strigosities on the outside of the first, the dorsal punctuation is very clear and somewhat coarse, and from the apex extends over about two-thirds of the elytra; the pygidia are densely punctured; the prosternum, keel with a few scattered punctures and a marginal stria, which turns outwards close to the base, but does not quite reach the edge, anteriorly the striæ widen out and markedly join behind the anterior edge, enclosing a lobe-shaped area, near the middle of this space the striæ join a strong curved lateral carina; the mesosternum is wholly and coarsely punctate and the marginal stria is fine and very minutely irregular; the metasternum is widely impressed in its median area, and the punctures are smaller and arranged chiefly along the base and at the anterior angles. Whether the metasternum is impressed in both sexes I cannot say. The prosternal striæ and lateral carinæ are framed on the same plan as those of *S. dussaulti*, Mars. The colours of this species are very attractive.

*Hab.* Pingshiang, South China (*Dr. Kreyenberg*). One specimen in the Deutsches Ent. National Museum of Berlin, and one in my own collection.

*Saprinus æquipunctatus*, Horn, 1870.

Horn describes this species (Synopsis, p. 133, 1873) as having the upper portion of the pygidium "vertical and the apical part horizontal"; but it is the basal or upper portion

which is horizontal and the posterior part has an oblique outline when viewed sideways. In the Trans. Am. Ent. Soc. p. 140 (1870) Horn states that the pygidium of *æquipunctatus* is "very convex." Perhaps the sexes differ; I have only seen the male. The form of the pygidium somewhat resembles that of *Teretriosoma chalybæum*, Horn, a species not rare in Texas. Near the posterior edge in the *Saprinus* are two somewhat wide, shallow, transverse depressions in the male.

*Saprinus walkeri*, Bickhardt, Ent. Bl. p. 186 (1910).

No species has been described under this name, but the name refers to a specimen that Walker had in 1871 (see Ann. & Mag. Nat. Hist. xv. p. 468, 1885), but which has long since perished. I am indebted to Mr. G. J. Arrow for the following memorandum from the archives of the Natural History Museum regarding the destruction of Mr. J. K. Lord's collection, and I think that it is well to publish it:—

"Dr. Keatinge, Director of the School of Medicine, Cairo, wrote to me [G. J. Arrow]:—Dr. Innes (ex-Director) informs me that when he was first appointed to this School, more than 20 years ago, he found that, owing to neglect, nothing remained of Lord's collection except the labels, the insects having all been eaten."

The Recorder of the 'Zoological Record' of 1871 says that "Walker gives a catalogue of 173 species taken by Mr. Lord, followed by brief and insufficient English diagnoses of 2 new genera and 50 new species." The specimens now are non-existent. The name of *S. walkeri* in the Berlin Catalogue of 1910 therefore shows that a name in a catalogue does not necessarily represent any known species.

*Hypocaccus asticus*, sp. n.

Ovalis, convexus, æneus vel rufo-piceus, nitidus, antennis pedibusque rufis; fronte strigosa; pronoto dense punctato, disco postice lævi; elytris dimidia parte postica tenuiter punctulatis, stria suturali integra, antice arcuatim juncta, dorsalibus 2–4 dimidiatis, 1 subintegra postice sinuata; pygidio tenuissime punctulato; prosterno basi lato, striis postice abbreviatis; mesosterno lævi, stria transversa nulla; tibiis anticis 4-dentatis.
L. 2 mill.

This species is very similar to *rufipes*, Payk., but the outline of the body is broader and more convex, the elytral punctuation is finer and less dense, also the points on the pygidia; the prosternum is wide at the base, one-third wider than that of *rufipes*, the striæ are shortened at the

base behind the coxæ, but are otherwise like those of *rufipes*; the mesosternum has a few microscopic punctures, no stria divides it from the metasternum, but the suture is indicated by 8 or 10 small points. *H. rufipes*, Payk., has the mesosternum clearly punctate and a strong crenulate stria at the metasternal suture, and the prosternal striæ almost reach the base.

*Hab.* Japan. I found it on the sand-dunes at Enoshima in May 1880.

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## XII.—*New Species of Heterocera from Costa Rica.*—IX.

By W. Schaus, F.Z.S.

I am greatly indebted to Sir George F. Hampson, Bart., for the descriptions of new genera appearing in this paper.

### Noctuidæ.

*Euxoa cartagensis*, sp. n.

♂. Palpi black, irrorated with brown; head, collar, and thorax brown, tinged with violaceous, the collar with a fuscous transverse line. Abdomen fuscous brown. Fore wings buff-brown; the lines brown-black; basal and subbasal geminate dentate lines to below cell; antemedial geminate, interrupted, outwardly oblique from median to submedian, outangled below submedian; a darker annular spot coalesces with line below cell; cell filled in with dark brown from antemedial to reniform, interrupted by the large round orbicular close to subcostal; reniform large, outlined in buff and filled in with dark brown and fuscous-grey scales; postmedial fine, lunular, the points projecting on veins; the subterminal fine, preceded by a dark brown shade on costa, and dark dashes between veins from 6 to fold, followed by a fine buff line and fuscous-grey terminal shadings except at apex. Hind wings whitish at base; veins and outer half fuscous brown.

Expanse 38 mm.

*Hab.* Cartago, Juan Vinas.

*Episilia cirphioides*, sp. n.

♂. Palpi dark brown, tipped with whitish buff. Head and thorax whitish buff; collar olive-grey in front, separated

from the whitish buff behind by a fuscous line. Abdomen above dark grey, the anal segment whitish buff. Fore wings whitish buff, with a few scattered black and brown scales; a fuscous line at base below cell; the median and vein 4 to outer spots finely dark olive-brown; a small cluster of dark brown scales antemedially on costa and another below cell; orbicular a minute dark point; reniform round, fuscous grey; an outer row of dark brown points on veins; terminal black points largest towards apex; the termen shaded with brown; a dark streak postmedially between 3 and 4, and a brownish shade above it obliquely to below apex; a fuscous shade on costa above orbicular and one above reniform. Hind wings white; the costal margin and apex shaded with fuscous grey. Fore wings below shaded with fuscous through and beyond cell; the median and veins postmedially streaked with fuscous; a black discal spot; a postmedial black line on costa.

Expanse 32 mm.

*Hab.* Juan Vinas.

Near *Episilia rufisigna*, Hmpsn.

*Episilia nezia*, sp. n.

♂. Palpi brown below, whitish buff above; frons, collar, and thorax whitish buff; vertex buff-brown; a velvety black transverse line on collar; abdomen dark grey, the anal hairs ochreous brown. Fore wings brownish buff; a black line below cell from base to below orbicular; orbicular and reniform small, slightly paler; a black streak in cell from close before orbicular to reniform; terminal dark points between the veins. Hind wings thinly scaled, white; a terminal brownish-buff line.

Expanse 35 mm.

*Hab.* Volcano Turrialba.

Belongs to Section II.

*Nephelistis noctivaga*, sp. n.

♂. Palpi, head, collar, thorax, and dorsal basal tuft on abdomen violaceous brown; abdomen dull fuscous brown, with subdorsal buff hairs at base. Fore wings violaceous brown, shaded with bronze medially between cell and submedian; lines dark brown, the basal and postmedial outwardly edged with light brown, the antemedial inwardly so edged; the basal line indistinct; the antemedial oblique on costa, inbent along subcostal, straight to submedian, slightly

outcurved below it ; the postmedial outbent on costa, then inwardly oblique to inner margin ; orbicular large, round, the reniform large, both dull lilacine brown, the latter with a dark line near its edge; subterminal light bronze-brown lunules, shaded with dark brown ; minute white points at end of veins ; short white streaks on costa beyond postmedial. Hind wings fuscous brown, thinly scaled at base and along inner margin, the veins brown; a dark shade on discocellular; cilia light brown at base, followed by a fuscous shade and tipped with whitish buff. Hind wings below whitish, irrorated with brown, thickly on costal half ; a dark spot on discocellular; a dark postmedial line.

Expanse 37 mm.

*Hab.* Volcano Turrialba.

Near *N. congenitatis.*

*Eriopyga moneti*, sp. n.

♂. Palpi fuscous, fringed with buff. Head, collar, and thorax reddish brown. Abdomen above fuscous, with light brown hairs dorsally ; anal hairs fuscous and light brown ; reddish-brown hairs laterally. Fore wings dark red; veins and lines black ; some ochreous shadings at base and below cell antemedially ; antemedial line geminate in cell and on inner margin, outcurved below cell and submedian ; orbicular round, outlined in ochreous, close to subcostal; a black medial shade ; reniform oblique, inbent behind, irrorated with ochreous and partly edged with white behind; postmedial indistinct, geminate ; subterminal partly shaded with ochreous, especially above vein 7 ; buff points at end of veins ; cilia black, mottled with brown. Hind wings fuscous brown ; cilia roseate buff.

Expanse 30 mm.

*Hab.* Juan Vinas.

Near *E. renalba,* Schs.

*Trichestra mixta,* sp. n.

♀. Head, collar, and thorax mottled lilacine brown, greyish buff, and fuscous brown ; the dorsal tufts of abdomen similar. Fore wings : the basal half and outer margin lilacine grey, tinged with brown; basal line geminate, dark brown, outangled ; the antemedial dark brown, geminate, outangled below cell, outcurved below submedian, divided by a greyish-white line, and preceded on inner margin by a dark brown spot ; orbicular a roseate point, edged with whitish, and then dark brown close to subcostal ; a dark brown shade

at end of cell, followed by a white line, and then a roseate line on discocellular, the dark shade extending to inner margin and expanding outwardly below vein 3 to a white line which bifurcates at vein 4 and surrounds a dark brown space beyond discocellular; the white line outwardly edged by the fine black postmedial line, which is followed by a roseate shade, all terminating at vein 8, the costa being irrorated with lilacine and roseate and shaded with fuscous grey, divided by whitish spots from above reniform to apex; some dark shadings close to roseate shade; terminal dark spots and faint subterminal whitish points darkly edged; cilia fuscous grey, tinged with roseate at base and divided by a lunular white line. Hind wings greyish brown, somewhat whitish at base; a dark discal spot; cilia whitish, with dark spots.

Expanse 23 mm.

*Hab.* Poas.

*Miselia umbrata*, sp. n.

♀. Head, collar, and thorax mottled brown and buff; a velvety black transverse line on collar. Abdomen buff-brown, irrorated with black; dorsal tufts at base brighter brown. Fore wings grey-brown, shaded with lilacine; the costal margin and basal half of cell buff; oblique black spots on extreme costa; a dark streak at base below cell; base of inner margin shaded with fuscous; antemedial line outcurved, faintly geminate, followed in cell by the orbicular, which is large, buff, outlined in black, and below cell by a curved black line; reniform large, brown, edged with buff, and preceded and followed by a dark brown shade; a lunular dark brown line from reniform, suffusing partly with the inner part of the geminate postmedial line, which is very oblique on costa to vein 7, then inwardly oblique and finely lunular; beyond postmedial the veins are black, irrorated with buff; a fuscous-brown shade between 4 and 6 from postmedial to termen, crossed by subterminal buff spots; a fuscous-grey shade above tornus, with subterminal buff spots at vein 2; terminal fuscous-brown streaks between the veins; terminal buff shades on veins extending on cilia, which are brown basally, followed by a buff shade and tipped with black. Hind wings fuscous brown, the cilia partly yellowish. Hind wings below whitish buff, irrorated with dark brown; a black discal spot; a broad dark postmedial shade; base of inner margin fuscous brown.

Expanse 35 mm.

*Hab.* Juan Vinas.

*Miselia albimixta*, sp. n.

♀. Palpi white in front, mottled laterally and above with light brown. Head white, mottled with lilacine brown. Collar and thorax mottled lilacine brown, white, and green, with a few black irrorations. Abdomen lilacine brown above, laterally whitish irrorated with black, ventrally white and ochreous. Fore wings chiefly lilacine brown; base of costa and cell ochreous green; a black basal line on costa, outwardly edged with white; a black basal line below cell; antemedal line fine, black, shaded with white, outcurved below cell, preceded by black and white irrorations on veins; orbicular and reniform ochreous green, broadly edged with white, both constricted, the orbicular oblique, its white margin suffusing with a white line below cell partly surrounding an ochreous-green spot; the inner margin medially white, irrorated with ochreous green; the costal margin from antemedial to apex spotted with white; postmedial fine, black, dentate from veins 8–3, then straight, shaded with white and followed by black irrorations and white points on veins, except on vein 5; the outer margin rather broadly white, irrorated with green, interrupted by a brown shade from just above vein 4 to vein 6, the white extending at veins on to fringe, leaving broad brown lunules crossed by darker lines on cilia. Hind wings fuscous brown; cilia white, shaded with light reddish brown. Hind wings below white, irrorated on costa with ochreous brown; a dark medial line from costa across discocellular; a postmedial deeply lunular black line, faintly marked between 2 and 4; a terminal lunular black line from vein 2 to apex; cilia shaded with light reddish brown.

Expanse 34 mm.

*Hab.* Juan Vinas.

Leioselia, gen. nov.

Proboscis fully developed; palpi upturned, the second joint reaching to vertex of head and rather slenderly scaled, the third moderate; eyes large, round; antennæ of female somewhat laminate and almost simple; thorax clothed almost entirely with scales and without distinct crests; tibiæ moderately fringed with hairs; abdomen without crests. Fore wing with the apex rounded, the termen evenly curved and slightly crenulate; veins 3 and 5 from near angle of cell; 6 from upper angle; 9 from 10 anastomosing with 8 to form the areole; 11 from cell. Hind wing with veins 3,

4 from angle of cell; 5 obsolescent from middle of discocellular; 6, 7 from upper angle; 8 anastomosing with the cell near base only.

Type of genus, *Leioselia egregia.*

*Leioselia egregia*, sp. n.

♀. Palpi, vertex, collar behind, and patagia lilacine brown; frons whitish; collar in front greenish; thorax posteriorly white; abdomen light reddish brown. Fore wings: the base pale green, crossed by a broken black line; antemedial space dark lilacine, with a large paler spot above submedian, outwardly irregular, faintly edged with white, and then by the antemedial black line, which is outcurved, slightly lunular, interrupted on subcostal and median veins; medial space lilacine, suffused with green on costa, in cell close to antemedial, and just below cell; the inner margin green, mottled with white; a fuscous-brown medial curved shade to submedian, interrupted by reniform; the reniform narrow, greenish, outlined finely with white; postmedial line, fuscous brown, deeply outcurved beyond cell, heavily marked by spots between veins 4 and 6; space beyond postmedial to subterminal dark lilacine, the veins irrorated with grey and white; the apex above vein 7 white, irrorated with green; the subterminal from vein 7 wavy, whitish; the outer margin greenish grey; a lunular terminal black line; cilia brown, spotted with fuscous. Hind wings brown, tinged with lilacine. Fore wings below with a dark line and spot on costa before apex. Hind wings below white; the costal margin broadly irrorated with lilacine and dark brown; a fine medial dark streak on costa; an interrupted dentate postmedial line.

Expanse 29 mm.

*Hab.* Sixola.

Near *M. marmorata*, Schs.

*Trachea nigrescens*, sp. n.

♀. Head, collar, and thorax fuscous grey, mottled with lighter grey; a transverse black line on collar. Abdomen brownish grey, with dorsal black tufts. Fore wings fuscous grey, faintly tinged with brown on postmedial space; lines black, indistinct; basal line deeply outangled on inner margin; antemedial outcurved, geminate, divided by a third line between cell and submedian; orbicular large, outlined in black; a brown-black wavy medial geminate line; the reniform white, irrorated with yellow, edged by a black line,

preceded by a greyish and a dark line; the postmedial outcurved from costa above reniform, angled at vein 5 and slightly incurved, the inner part heavily marked, the outer part very fine; the subterminal broad, irregular, with branches to terminal line, and crossed by a faint brownish line; the terminal line outwardly lunular; cilia dark grey, shaded with brown. Hind wings grey-brown, tinged with opalescent white on basal half where thinly scaled; a dark point on discocellular; a wavy dark terminal line; cilia fuscous brown, tipped with white.

Expanse 33 mm.

*Hab.* Juan Vinas.

Near *T. impulsa*, Gn.

*Trachea altivolans*, sp. n.

♂. Palpi brown in front, laterally black; head, collar, and thorax lilacine brown; abdomen brownish grey, more darkly irrorated, anal hairs reddish brown. Fore wings light brown, tinged with lilacine on basal half; orbicular space outlined by a fine dark line, deeply toothed towards base, outwardly sinuous, obsolescent below subcostal, followed by a fuscous-grey shade from costa to below reniform; reniform large, somewhat oblique, its outer margin incurved, outlined in buff-brown, and containing a curved darker line; a fine black line from base below cell to a black shade below vein 2, then inbent to middle of wing, angled to submedian and outcurved below it; two fine oblique dark lines on inner margin antemedially; postmedial line vague, deeply dentate, and fuscous on veins, followed by short fuscous streaks; termen fuscous grey, wedge-shaped between the veins, shaded with dark brown next to subterminal area; base of cilia brown, followed by a fuscous line and then by dark grey, all interrupted by buff-brown scales at end of veins. Hind wings whitish buff, the dark discal spot and postmedial line of underside visible above; veins greyish brown; a terminal fuscous line; base of cilia light brown, followed by a darker line and tipped with white.

Expanse 36 mm.

*Hab.* Volcano Poas.

*Trachea supera*, sp. n.

♀. Palpi and frons dark violaceous brown, irrorated with white; vertex brown, with ochreous hairs at base of antennæ; collar and thorax mottled dark brown and dull green, slightly irrorated with white; abdomen dark grey, dorsal tufts ochreous brown. Fore wings: base greenish, crossed

by a geminate black line, inwardly oblique on costa, outset and inwardly oblique below cell; antemedial space dark greyish brown, limited by the lunular black antemedial line, which is faintly geminate, preceded and followed by some dark green on costa; orbicular annular, black, filled in with grey anteriorly; a fuscous-brown shade below orbicular, widening at fold to postmedial line, and followed by a mottled lilacine and reddish-brown shade; reniform almost round, green, edged with black and surrounded by a dark greyish-brown shade; postmedial fine, black, deeply lunular, outcurved beyond cell, outwardly shaded with dull lilacine, a fuscous-grey line, and a dark olive-brown shade; the costa green, crossed by black spots, partly irrorated with lilacine white; the postmedial followed by some green on inner margin; a subterminal irregular and broken green shade from costa to vein 2; below vein 2 a yellowish-white line angled on fold, marginal fuscous shadings widest at tornus and vein 5; terminal black spots between the veins and lilacine irrorations at veins; cilia crenulate, mottled green and brown, partly tipped with white. Hind wings white at base, otherwise dull fuscous brown; a black discal point; a postmedial dark line; cilia with a light brown line at base and tipped with white.

Expanse 40 mm.

*Hab.* Volcano Poas.

Near *T. leucodonta*, Hmpsn.

*Chytonix cyanochlora*, sp. n.

Palpi laterally brownish, fringed with bluish green, tipped with white; head white; collar and thorax bluish green, the former outwardly with a black spot; abdomen fuscous grey, with a faint whitish dorsal streak. Fore wings bluish green, the markings black; a basal spot on costa, emitting a line to submedian; an antemedial line, bifurcating on submedian, the inner portion oblique towards base, the outer portion excurved, and connected with an excurved line below cell; orbicular and reniform large, annular, contiguous; a broad black shade from costa to between these spots and a heavy shade from below reniform to inner margin; postmedial fine, lunular, dentate from vein 7 to inner margin; subterminal fine, white, preceded by a black shade from above vein 6 to costa. Hind wings fuscous grey; the apex and extreme outer margin tinged with bluish green; a darker line on disco-cellular and a faint dark postmedial line.

Expanse 27 mm.

*Hab.* Tuis, Esperanza, Sixola.

*Eriopus dapsilis*, sp. n.

♂. Palpi lilacine buff, streaked in front and laterally with black. Head black, frons near proboscis lilacine buff; collar black, crossed by a fine white line and tipped with lilacine. Thorax mottled greenish buff and white. Fore wings black, the veins and lines white; a geminate basal line on costa and an inwardly oblique subbasal line, concealed below cell by a large tuft of long ochreous hairs which reach the antemedial line; the antemedial remote from base, nearly straight to submedian, then sharply incurved; an oblique line across cell from subcostal at antemedial, and beyond a finer line is angled at middle of discocellular, the latter being irrorated with ochreous scales, and is followed by another line also angled at its middle; the postmedial consists of two parallel lines, straight and oblique from costa to vein 4, incurved and suffusing between 4 and 3, incurved and separate from 3 to submedian, and partly suffusing on inner margin; a subterminal and marginal line from apex, connected from below vein 4 by a greyish and ochreous shade, becoming reddish brown at tornus; a terminal white line; cilia olive-grey and white, shaded with dark brown between veins 4 and 7. Hind wings brown-black; a dark streak on discocellular; cilia below vein 4 ochreous, above vein 4 black tipped with white.

Expanse 33 mm.

*Hab.* Juan Vinas.

*Eriopus carmioli*, sp. n.

♂. Palpi reddish brown, circled with white at base and end of second joint. Head mottled reddish brown and lilacine. Thorax too rubbed to describe. Fore wings brown, tinged with lilacine, a fuscous shade at base below cell and on inner margin; antemedial line whitish, outwardly edged with fuscous brown, incurved in cell, outcurved below it and on inner margin; orbicular small, whitish, edged with fuscous brown; reniform large, outlined in whitish, projecting posteriorly along vein 3; postmedial white, outcurved from vein 8, slightly incurved below 6, from which point it is outwardly broadly shaded with pale olive, inwardly shaded with fuscous brown, and on costa shaded with roseate; subterminal broad, silvery white, divided from below vein 6 by a brown-black line; a white streak from subterminal on to cilia along vein 4, and a similar streak from 6 to apex; terminal black lunules; cilia roseate brown. Hind wings fuscous brown.

Fore wings below fuscous; the costa and outer margin reddish; subterminal white points and a short postmedial white line on costa. Hind wings below: the costal half reddish; the inner half white; a fuscous spot on discocellular; a terminal and two dark streaks above it at anal angle.

Expanse 21 millim.

*Hab.* Avangarez.

Named after Mr. Carmiol, who kindly gave me the specimen.

LOPHOMYRA, gen. nov.

Proboscis rather short and slight; palpi upturned, second joint to vertex of head, third short; frons smooth; eyes large, round; antennæ of male laminate. Thorax clothed chiefly with scales, the pro- and metathorax with small spreading crest; tibiæ fringed with long hair and scales; abdomen with dorsal crests on basal segments. Neuration normal.

Belongs to the *Xylomyges* group.

*Lophomyra tacita*, sp. n.

Head, collar, and thorax mottled buff-brown, grey, and lilacine white. Abdomen ochreous brown. Fore wings: basal third of costa lilacine, with black irrorations at base, medially shaded with light brown; outer part whitish, irrorated with yellowish green; a lilacine shade in middle of cell, and a lilacine shade below it except close to end of cell, where there is some greenish yellow edged with light reddish brown; a fuscous line below median to antemedial, which is deeply outcurved, ending in some fuscous scales above submedian; the inner margin broadly greenish yellow; a white streak on median at end of cell; a median fuscous shade oblique from costa, angled at vein 3, and interrupted on submedian; postmedial space from vein 8 to vein 2 lilacine, followed by a deeply dentate fine dark line, punctiform on outer angles, the line outwardly shaded with white, and also inwardly on veins 3 and 4; a fuscous line along vein 5; a subterminal fuscous-grey shade between 5 and 7, and a broad yellowish-green shade from vein 4 to inner margin; the termen whitish, shaded with grey above vein 2; a terminal dark line; cilia light golden brown. Hind wings lilacine brown. Hind wings below whitish, irrorated with buff on costa; a deeply dentate dark subterminal line from costa to below vein 6 and points on veins 2–4.

Expanse 31 mm.

*Hab.* Sixola, Juan Vinas.

*Monodes perigeana*, sp. n.

♂. Palpi, head, collar, and thorax lilacine brown, irrorated with whitish lilacine. Abdomen grey-brown, with darker transverse shades; anal hairs lilacine buff. Fore wings glossy lilacine brown, with darker irrorations; a fuscous-grey shade in cell between spot and below cell medially; the antemedial and postmedial very fine, fuscous, the latter followed by dark points on veins; the orbicular and reniform defined by the fuscous-grey shadings; small subterminal dark brown dashes between the veins; terminal buff points, connected by an indistinct dark line; a dark brown spot at base of costa. Hind wings white; the veins terminally and the outer margin narrowly shaded with fuscous; a dark terminal line; cilia shaded with light brown basally, tipped with white.

Expanse 31 mm.

*Hab.* Carillo, Juan Vinas.

*Monodes delenifica*, sp. n.

♂. Palpi dark brown, fringed with white in front; the terminal segment white, ringed with dark brown. Head, collar, and thorax olive-green, mottled with white. Abdomen fuscous grey. Fore wings whitish, shaded with olive-green; the costal margin spotted with black; two small black spots near base below cell; some black scales antemedially in cell and below it, followed below cell by a velvety-black shade which borders the reniform below and outwardly to vein 6, extending between 5 and 6 to postmedial; the reniform large, white, crossed by a faint greenish line and inwardly edged by a black velvety line which does not meet the heavier black shade below cell; the reniform anteriorly suffusing with a white costal shade; orbicular a black point on an olive-green shade; the postmedial finely dentate, black from vein 8 to submedian fold; the outer margin mostly olive-green; the subterminal consisting of rather large black spots partly edged with white; terminal triangular black spots, inwardly edged with white; cilia green on basal half, terminally white spotted with black. Hind wings whitish, thinly scaled, irrorated with fuscous grey; the outer half darker beyond the postmedial dark line; a small discal spot.

Expanse 26 mm.

*Hab.* Cartago.

*Monodes renipes*, sp. n.

Head, collar, and thorax mottled dark and lighter brown.

Abdomen greyish, thickly irrorated with dark brown. Fore wings brown, darkest on costa and cell to postmedial and on outer margin; the inner margin broadly buff; a darker geminate basal line, broken and indistinct; the antemedial geminate, straight to submedian, then outcurved, preceded by a dark brown shade on median, incurved below cell, and followed below cell by an ovate brown line; orbicular round, whitish buff, edged with dark brown; reniform in the shape of a foot with the toe pointed towards and almost reaching orbicular, outlined in brownish buff; subcostal medially fuscous, with a dark spot above it; postmedial geminate, oblique to vein 6, then slightly incurved and angled on submedian, followed by whitish points and fuscous streaks on veins 2–6; below reniform a brownish line, inbent below submedian; a subterminal black streak above vein 7; terminal pale points; cilia fuscous grey, paler at tornus. Hind wings smoky brown, thinly scaled, showing the dark discal spot and postmedial line of underside.

Expanse 29 mm.

*Hab.* Juan Vinas.

*Monodes optata*, sp. n.

Palpi dark brown, fringed and tipped with buff; head buff; collar and thorax buff-green, the collar tipped with buff. Fore wings pale olive-green; two small clusters of brown-black scales at base of costa, and a similar larger spot below cell; a wavy whitish antemedial line outwardly very finely shaded in places with dark brown; orbicular round, white, circled with brown-black, followed by a similar shade to reniform space, this space extending above cell on costa; reniform space consisting of a fine white line, a brown-black line, and then darker green outwardly shaded with whitish and a few dark brown scales; postmedial line fine, dark brown, wavily dentate, outcurved around cell, shaded outwardly with lilacine grey and white; a rather large brown-black spot on costa before apex, and small subterminal clusters of dark scales between the veins, the largest between 4 and 5, the spots between 5 and 8 outset; a terminal black line, interrupted by veins, its inner edge lunular. Hind wings fuscous grey; a dark discal spot. Hind wings below greenish white; a large black spot on discocellular; a postmedial lunular dentate line; a subterminal fuscous shade, obsolete towards anal angle.

Expanse 34 mm.

*Hab.* Juan Vinas.

Near *M. orbiculata*, Schs.

*Monodes colœrens*, sp. n.

♂. Head, collar, and prothorax dark brown, thorax otherwise and patagia lilacine buff, with some whitish irrorations. Abdomen dark grey. Fore wings roseate buff; a whitish streak from middle of costa to inner margin near tornus, edged with metallic steel-grey scales at end of cell, which form the base of a triangular steel-grey line; the apical area beyond the white line and above vein 2 dark velvety brown, with a white line before apex; an irregular fine black line near base; an irregular medial line, preceded by greyish scales on median and submedian veins; a terminal greyish streak on vein 2; base of cilia faintly spotted with grey. Hind wings thinly scaled, shaded with brown, darkest on outer margin; a dark line on discocellular; cilia tipped with white.

Expanse 17 mm.

*Hab.* Juan Vinas, Tuis.

*Monodes malaca*, sp. n.

♂. Palpi dark brown, mottled with buff; head, collar, and thorax ochreous brown, patagia fuscous grey; abdomen fuscous grey, anal hairs light brown. Fore wings brown, tinged with lilacine; a small velvety-black spot on base of costa and a larger similar spot below cell; a pale brown antemedial curved line edged with fuscous-brown irrorations, forming a spot in cell; orbicular oblique, dark lilacine grey, edged by a fine buff line, the inner part continuing as an oblique line below cell to submedian fold near postmedial; a dark brown space between cell-spots; reniform large, faintly oblique, inwardly dark lilacine grey, edged by a fine buff line; a fine brown line from reniform to inner margin; postmedial outbent on costa close to reniform, fine, dark brown, interrupted by veins, and followed on vein 2, fold, and submedian by dark brown scales; a faint, subterminal, irregular dark line. Hind wings fuscous brown, showing faintly the large discal spot and broad postmedial line of underside.

Expanse 25 mm.

*Hab.* Tuis.

Very close to *M. callopistrica*, Hmpsn.

*Carbona cognata*, sp. n.

♂. Palpi buff-brown, darkly brown-streaked behind. Head, collar, thorax, and fore wings bright brown, faintly tinged with lilacine. Abdomen dull fuscous brown. Fore wings:

antemedial fine, indistinct, black, inset in cell, obliquely outcurved from median to submedian and again on inner margin; orbicular a small white spot; a faint median fuscous shade, oblique from costa to reniform, then straighter; reniform consisting of two fuscous spots at either end of discocellular, the hind spot the larger; the postmedial faintly curved on costa, consisting of a geminate row of black points; the outer margin shaded with fuscous; a terminal row of white points. Hind wings fuscous brown; a dark streak on discocellular; a fuscous postmedial line; cilia with a pale line at base and tipped with whitish. Hind wings below whitish, thickly irrorated on costa and outer margin with brown; the discal spot large; the postmedial line heaviest on inner margin.

Expanse 29 mm.

*Hab.* Juan Vinas, Cachi, La Florida.

*Carbona lucens*, sp. n.

♀. Palpi and head brown, the collar violaceous brown, the thorax lilacine brown; abdomen dull greyish brown; a dorsal dark velvety brown and opalescent basal tuft. Fore wings silky roseate brown; orbicular and reniform small, more darkly outlined; a narrow fuscous shade at base; a basal black streak on inner margin; an indistinct fine brownish antemedial line, followed below cell by a heavy black wavy line; the medial space below cell shaded with fuscous and crossed by a darker medial shade, dark brown above median and bifurcating on costa; a fine brown postmedial line, fuscous, heavily marked, and incurved below vein 2, followed by a fuscous-grey shade between 2 and 3; a subterminal dark brown shade, suffusing with the dark brown outer margin; a roseate brown shade before apex and at tornus; an interrupted fine terminal whitish line; cilia fuscous. Hind wings dark silky brown; cilia fuscous, tipped with white.

Expanse 26 mm.

*Hab.* Sixola.

*Perigea funerea*, sp. n.

Palpi violaceous black, fringed with buff. Head, collar, and thorax mottled dark and light reddish brown; the collar posteriorly and the patagia purplish black; the metathorax and base of abdomen with dorsal ochreous-buff tufts; abdomen otherwise fuscous, with fine segmental buff lines; anal hairs ochreous buff. Fore wings violaceous black; the inner margin streaked with buff and black towards base; medially

dark reddish brown ; basal, antemedial, medial, and outer buff spots on costa ; traces of a reddish-brown antemedial line below cell ; orbicular round, outlined in black and reddish-brown scales ; a black streak from orbicular to reniform, which is large, mottled with reddish brown, with a white spot and some white points posteriorly and a few white scales anteriorly ; postmedial slightly excurved, indistinct, tinged with reddish brown, and followed by faint white points on veins ; subterminal velvety-black streaks between veins, partly shaded with reddish brown ; a terminal light brown line with buff points at veins ; cilia black, divided by a fine pale lunular line, and irrorated with light brown. Hind wings fuscous ; cilia whitish yellow.

Expanse 28 mm.

*Hab.* Sixola.

*Perigea summota*, sp. n.

Head, collar, and thorax dull brown, faintly tinged with lilacine. Abdomen brownish grey. Fore wings dull brown ; the medial space and a subterminal shade fuscous brown, the lines still darker ; the basal line very indistinct ; the antemedial outbent to median, then straight to inner margin ; the postmedial slightly inbent from costa to vein 4, then faintly incurved ; reniform small, dull brown, faintly shaded with fuscous ; a terminal dark line with white points at veins ; cilia fuscous, with a brown line at base. Hind wings white ; the outer margin shaded with black ; a terminal black line from apex to vein 2.

Expanse 23 mm.

*Hab.* Sixola.

Near *P. tetera*, Wlk.

*Perigea illicita*, sp. n.

Palpi, head, and collar whitish, irrorated with dull red. Thorax whitish grey. Abdomen whitish grey, irrorated with darker grey. Fore wings silvery grey, the lines brownish ; some black scales below cell at base ; the antemedial fine, geminate, outcurved below cell and on inner margin ; a white line medially in cell V-shaped, not reaching median, its outer point downcurved along reniform and heavily edged below with velvety blackish brown ; some ochreous and reddish shading in V mark and also across reniform, which is also outwardly edged with white, and a fine velvety line, followed by a dark grey and reddish shade ; the postmedial fine, black, inwardly lunular between the veins, and with white

points on veins, preceded and followed by faint greyish shades, all very indistinct; outer margin shaded with roseate brown; a subterminal whitish shade and a black spot above vein 6; indistinct terminal fuscous spots; cilia brown, spotted with black. Hind wings fuscous grey; semilunar terminal black spots on apical half of outer margin; cilia greyish white.

Expanse 34 mm.

*Hab.* Carillo, Juan Vinas.

Near *P. agalla*, Dogn.

*Perigea æruginosa*, sp. n.

♂. Head and collar lilacine brown; a yellowish-buff spot on vertex. Thorax more strongly tinged with lilacine. Fore wings: costal margin lilacine grey, shaded with ochreous brown at base, and with small yellow spots towards apex; base of cell similar, followed by a yellowish spot, some grey medially, and a yellowish space at end of cell, the latter crossed by reddish lines; an oblique short white streak across median between veins 3 and 4; space below cell and vein 2 yellowish, irrorated with red, except medially between lines which is greyish; an indistinct reddish basal line; an antemedial reddish line forming three outward curves below subcostal; a reddish medial line and a similar postmedial line up and incurved from vein 3 to white streak, followed by dentate grey lines on veins 3–8, finely tipped with yellow and red; the postmedial area between 2 and 5 greyish, above vein 5 yellowish to apex; marginal reddish-brown shades between the veins. Hind wings white, some slight fuscous shadings on outer margin; a dark terminal line.

Expanse 22 mm.

*Hab.* Sixola.

*Gonodes netopha*, sp. n.

♀. Head, collar, and thorax buff; abdomen grey, irrorated with brown. Fore wings: the anterior portion from inner margin near base to outer margin below apex pale buff, faintly tinged with roseate in cell and near base below cell; basal dark brown irrorations on costa forming a geminate line, intercepted in cell and inwardly oblique, roseate brown, between cell and submedian; some fuscous-brown irrorations from costa medially to 7; posterior portion of wing brown; a blackish longitudinal streak medially below cell, edged with reddish brown; a dark point on discocellular behind; a fuscous streak from middle of vein 6 to below discocellular,

then incurved and outangled on submedian, the curved portion outwardly edged with white; a fuscous-brown spot between 3 and 4, followed by whitish streaks to termen; fuscous-brown spots terminally edged with whitish at tornus; cilia dark brown, streaked with buff. Hind wings whitish, shaded with fuscous grey, showing the discal spot and postmedial line of underside; cilia pale buff.

Expanse 26 mm.

*Hab.* Juan Vinas.

BRYOGRAMMA, gen. nov.

Proboscis fully developed; palpi upturned, the second joint to about vertex of head and slenderly scaled, the third moderate; frons smooth; eyes large, round; antennæ of male somewhat laminate and ciliated; thorax clothed chiefly with scales, the prothorax without crest, the metathorax with depressed crest; build slender; tibiæ moderately fringed with hair; abdomen without crests. Fore wings rather narrow, the apex rounded, the termen evenly curved and not crenulate; veins 3 and 5 from near angle of cell; 6 from upper angle; 9 from 10, anastomosing with 8 to form the areole; 11 from cell. Hind wing with veins 3, 4 from angle of cell; 5 obsolescent from middle of discocellular; 6, 7 from upper angle; 8 anastomosing with the cell near base only.

Type of genus, *Bryogramma sisera.*

*Bryogramma sisera*, sp. n.

♀. Head, collar, and thorax white, irrorated with fuscous brown; abdomen grey. Fore wings white, irrorated with grey; a black basal line, outwardly edged with clear white; antemedial line sinuous, black, inwardly edged with clear white; orbicular oblique, white, suffusing with a whitish shade below cell, which also suffuses with reniform; a fuscous shade in cell between the spots, containing a white line close to subcostal; reniform rather large, whitish, containing a few dark grey scales; postmedial clear white, curved close around reniform, and finely edged with fuscous scales, which suffuse at vein 3; an incurved black line from vein 2 to submedian, crossing the postmedial, and inbent below submedian; space beyond postmedial broadly brownish grey to the black subterminal shade, which is inbent at vein 5 and below vein 2; the outer margin white, partly irrorated with grey; a terminal black line interrupted by veins; cilia white, with a fuscous line and dark brown spots. Hind wings white;

some pale brownish irrorations on costa and outer margin from apex to vein 3; the black discal spot of underside visible; a fine brownish postmedial line; a terminal black line; cilia white. Underneath the postmedial line is replaced by a well-marked subterminal line.

Expanse 25 mm.

*Hab.* Volcano Poas.

*Neolita adin*, sp. n.

♀. Body pale buff, thinly irrorated with brown. Fore wings pale buff, irrorated with roseate brown, chiefly above submedian, in cell, and on outer margin; traces of fuscous lines on costa; the antemedial with a few fuscous scales in cell and on submedian; a fine dark medial shade oblique to a dark point on discocellular posteriorly; the postmedial remote from cell, outcurved, consisting of fuscous points on veins; a terminal fuscous line interrupted by veins; cilia dark grey-brown, spotted with pale buff at veins. Hind wings whitish, shaded with grey; a dark discal point.

Expanse 20 mm.

*Hab.* Laguna.

*Acidaliodes zattu*, sp. n.

♂. Palpi light brown; head, collar, and thorax grey; abdomen darker grey. Fore wings acute, slightly excised below apex, oblique below vein 3, grey, slightly irrorated with brown; the extreme costa light brown, with basal, antemedial, and medial small fuscous spots, and whitish spots towards apex; a faint, curved, antemedial brownish line; a fine medial line oblique from costa across discocellular; postmedial more heavily marked, brown, slightly oblique to vein 3, then outbent to near tornus, angled and oblique to inner margin; a whitish shade on outer margin, linear and dentate at tornus; a terminal dark grey line from apex to vein 3, then less distinct and slightly lunular; cilia yellowish at tornus, otherwise reddish brown tipped with yellowish. Hind wings brown, mottled with grey on outer margin; fine basal, medial, and postmedial lines of black irrorations; cilia brown, tipped with yellow near apex. Fore wings below fuscous, the inner margin broadly white. Hind wings below whitish; a marginal fuscous shade, chiefly near apex.

Expanse 16 mm.

*Hab.* Juan Vinas.

Near *A. excisa*, Hmpsn.

*Acidaliodes elam*, sp. n.

♀. Palpi and frons light brown; vertex, collar, and thorax white; abdomen whitish grey. Fore wings excised below apex and very oblique below vein 4, grey; the costa broadly white; dark brown spots on extreme costa except at base; a darker grey antemedial line, followed by a whitish shade; a postmedial whitish shade; subterminal white, angled above vein 6 and on vein 3, preceded by a darker grey shade from below vein 5; outer margin tinged with buff; a terminal black streak above tornus; three terminal black points between veins 4 and 7; cilia dark grey. Hind wings angled below vein 6, then sinuous to anal angle, buff-brown, becoming darker on outer margin; some fuscous irrorations medially and on inner margin before a subterminal whitish line; a terminal whitish line; cilia mottled grey and brown. Fore wings below black; the apex and outer margin white. Hind wings below white; some black at base; a broad subterminal black shade.

Expanse 14 mm.

*Hab.* Juan Vinas.

Near *A. truncata*, Hmpsn.

*Proroblemma rosea*, sp. n.

♀. Head and thorax dark grey; thorax paler, shading to lilacine roseate posteriorly; abdomen brownish buff. Fore wings lilacine roseate-brown crossed by numerous violaceous-brown striæ, more thinly at base, and partly suffusing on postmedial area; a black point as orbicular; a roseate streak on discocellular; postmedial line roseate, excurved on costal margin, and inwardly oblique from vein 7 to middle of inner margin; apex shaded with roseate; terminal black points. Hind wings whitish tinged with yellow; terminal dark points; the black discal point and faint postmedial line of underside perceptible above.

Expanse 22 mm.

*Hab.* Juan Vinas.

*Trogoblemma modesta*, sp. n.

♂. Palpi lilacine brown, fringed above with white; head and collar white, outwardly shaded with lilacine brown; abdomen greyish irrorated with brown. Fore wings brown, shaded with lilacine on costal and outer margins; scattered black irrorations on costa and basal area; orbicular and reniform consisting of a black point each; a faint postmedial

dentate, punctiform, whitish shade from vein 7, deeply incurved at vein 3; terminal black points; cilia dark brown. Hind wings whitish; a discal spot and punctiform post-medial fuscous line; terminal black points; some fuscous hairs on inner margin. The female has the hind wings suffused with brownish grey.

Expanse 19 mm.

*Hab.* Juan Vinas.

ANABLEMMA, gen. nov.

Proboscis aborted and slight; palpi upturned, the second joint reaching to vertex of head and very broadly rounded with scales in front, the third short; frons smooth, with tuft of hair above; eyes large, round; antennæ of male minutely ciliated; thorax clothed almost entirely with scales and without crests; tibiæ slightly fringed with hair; abdomen with small basal crest only. Fore wing narrow, the costa arched towards apex, which is produced and acute, the termen angled at vein 4, then oblique; vein 3 from well before angle of cell; 4, 5 from angle; 6 from below upper angle; 7, 8, 9, 10 stalked; 11 from cell. Hind wing with veins 3, 4 from angle of cell; 5 nearly fully developed from well above angle; 6, 7 from upper angle; 8 anastomosing with the cell to near middle.

Type of genus, *Anablemma lebana.*

*Anablemma lebana,* sp. n.

♂. Palpi and frons dark brown; vertex and body lilacine grey, a dark brown dorsal spot on anal segment. Fore wings lilacine grey, thinly irrorated with black, the costal half shaded with brown; lines fine, brown, edged with grey on costa, more heavily marked on inner margin; the inner line nearly straight; the outer line outcurved below costa and inwardly oblique, followed on inner margin by a black-brown spot; a terminal brown shade, heaviest towards apex; cilia grey, finely streaked with white, and with brown spots at tips. Hind wings grey, shaded with brown terminally, and a fuscous shade at vein 2.

Expanse 20 mm.

*Hab.* Sixola.

*Anablemma ziha,* sp. n.

♂. Palpi and frons ochreous brown; vertex, body, and fore wings lilacine, with a few scattered black scales. Fore

wings: costa and lines olive-brown, the latter finely edged with scales paler than ground-colour; the antemedial and postmedial lines outcurved from costa; some terminal black scales; cilia mottled with brown; some black on cilia of inner margin near tornus. The outer margin produced at vein 6. Hind wings buff-brown.

Expanse 16 mm.

*Hab.* Banana River.

*Anablemma harsha*, sp. n.

♂. Palpi and frons fuscous brown, vertex, collar, and thorax whitish finely striated with buff-brown; abdomen lilacine, with a black dorsal spot beyond middle. Fore wings: the apex acute, slightly falcate; anterior half olive-brown, shading to lilacine irrorated with olive-brown on inner margin; lines fine, olive-brown, shaded on either side with lilacine; the antemedial slightly curved, the postmedial wavy, outcurved below costa, incurved near inner margin; terminal dark velvety spots between veins, the most noticeable above tornus and below apex. Hind wings whitish, the outer margin rather narrowly shaded with greyish brown; a terminal black streak before vein 2; discal point and postmedial line of underside faintly indicated.

Expanse 21 mm.

*Hab.* Volcano Turrialba.

*Anablemma necoda*, sp. n.

♀. Palpi and frons dark brown; vertex and body creamy buff; anal hairs and a transverse brown fascia on abdomen posteriorly lilacine and reddish brown. Fore wings creamy buff, the costal margin shaded with olive-brown: medial and postmedial oblique brown streaks on costa edged with white; a few dark irrorations on inner margin and outer half of wing; a fine medial dark line across cell; an inwardly oblique heavily marked fuscous-brown line below cell, interrupted by submedian, and finer below it; a fuscous-brown line on discocellular, preceded by an olive-brown shade; postmedial fine, inwardly oblique, punctiform, terminating in a fuscous-brown spot on inner margin; an indistinct subterminal brownish shade; a fuscous-brown terminal line, partly interrupted, and more heavily marked between veins 3 and 5. Hind wings yellowish buff; a fine postmedial line downbent and more heavily marked on inner margin; traces of a terminal dark line.

Expanse 21 mm.

*Hab.* Juan Vinas.

*Lycaugesia hatita*, sp. n.

♀. Palpi mottled brown and white, head and collar white, thorax ochreous and white; abdomen grey, dorsally irrorated with ochreous. Fore wings reddish brown, shaded with ochreous at base; the costal margin chiefly white; the apex broadly white, narrowing to vein 4, and with terminal black points; terminal fuscous spots below vein 4 to tornus, shaded with white; a darker antemedial line, angled on subcostal and inwardly edged with white; a white line across end of cell, incurved and outbent to inner margin; a dentate white line above inner margin near tornus; cilia white above vein 4, grey below it. Hind wings ochreous yellow irrorated with brown, forming a broad subterminal shade; a white discal spot followed by and preceded by dark irrorations; some white terminally, crossed by a dark irregular lunular line; cilia white. Fore wings below fuscous shaded with white at apex. Hind wings below white, the outer margin broadly fuscous.

Expanse 12 mm.

*Hab.* Juan Vinas.

Near *L. rubripicta*, Hmpsn.

*Drobeta bullata*, sp. n.

♂. Palpi whitish buff, outwardly streaked with black. Head and collar mottled brown and buff; a dark transverse line on collar. Thorax and abdomen above dark brown and fuscous; thorax underneath and anal hairs white. Fore wings dark brown, strongly shaded with black on basal half; costal margin slightly swollen medially; an antemedial geminate black line, filled in with dark brown, straight to median, then inwardly oblique, and outcurved on submedian; orbicular, a small black ring filled in with dark grey scales; an indistinct medial black line; reniform brown, edged with a few whitish-buff scales; postmedial geminate, black, wavy to vein 3, then inbent and straight to inner margin; a subterminal heavy fuscous shade from 8–4, fine and indistinct below vein 4, outwardly finely shaded with lighter brown; outer margin shaded with fuscous grey; a terminal lunular velvety fuscous-brown line, and buff points at veins. Hind wings with the outer margin inbent at vein 2, and an elongated fovea on vein 2 below, forming a raised globule above, fuscous brown, shaded with white around fovea; cilia with whitish streaks at veins; whitish hairs on inner margin.

Expanse 25 mm.

Female wings normal. Fore wings : the reniform space whitish buff, surmounted by a white spot on costa ; the postmedial geminate line filled in with white, and followed below vein 3 by a greyish-buff shade.

Expanse 28 mm.

*Hab.* Sixola, Banana River.

The female is very much like *Lithacodia veternosa*, Schs., but much smaller.

*Parangitia temperata*, sp. n.

♀. Palpi, head, collar, and thorax buff; the patagia outwardly shaded with dark brown. Abdomen dark grey. Fore wings: the medial area buff shaded with brown, darkest near postmedial line, leaving the base and inner margin fuscous and dark grey, tinged with lilacine, separated by a vague fuscous antemedial line, straight from costa to near submedian, curved and upturned below reniform, then outbent to postmedial ; orbicular a dark brown spot surrounded by lilacine buff; the reniform consisting of a brown streak on discocellular edged with lilacine buff ; the postmedial black, geminate, outcurved, followed by a whitish shade from costa to vein 6, and by dark grey shadings below 6 ; a subterminal whitish line, preceded by a dark velvety streak below costa, and interrupted between 3 and 6 by a dark grey terminal shade. Hind wings dark brown, shaded with fuscous on outer margin ; cilia reddish buff.

Expanse 23 mm.

*Hab.* Juan Vinas, Tuis.

*Parangitia guanacaste*, sp. n.

♂. Head lilacine buff. Collar medially and thorax buff ; collar outwardly and patagia dark brown and fuscous. Abdomen above brown with subdorsal buff lines ; a lateral whitish-grey streak. Fore wings : the base brown, limited by an oblique antemedial black line to middle of inner margin, and crossed by basal black shade to submedian ; medial space grey, crossed by a fuscous-grey line oblique from costa between orbicular and reniform, angled below the latter and incurved to inner margin; the orbicular and reniform outlined with fuscous grey ; the postmedial line black, oblique from costa to vein 4, incurved and finely dentate, parallel with medial line, followed by a brown line, from costa to vein 4, and another black line which coalesces with a terminal black shade between 3 and 5 ; some brown shading above tornus; subterminal black scales forming a dentate

line near costa. Hind wings dark brown; the costa whitish, shaded with brown at apex.

Expanse 24 mm.

♀. Fore wings brown, shaded with reddish medially on costa and below cell; antemedial and medial lines less distinct; postmedial fine, black, the dark lines following it as heavily marked as in male; the apex shaded with dark grey. Hind wings with the cilia ochreous brown, shading to reddish brown at apex.

Expanse 25 mm.

*Hab.* Avangarez.

*Angitia caliginosa*, sp. n.

♂. Palpi and head buff; a dark transverse line on vertex. Collar and thorax fuscous brown mottled with grey and buff. Abdomen dark grey irrorated with buff scales and crossed by fine buff lines posteriorly on segments. Fore wings dark brown shaded with fuscous; the base broadly fuscous, limited by a faint grey-brown shade, forming the inner portion of a vague antemedial dark geminate line; the costal margin shaded with lighter brown; a dark median shade angled at reniform, which consists of a buff point; postmedial fine, black, geminate, partly filled in with buff-brown scales, wavily oblique from costa, and slightly angled between 3 and 4; subterminal shadings very indistinct, forming a fuscous spot below costa, above vein 5; some terminal buff-brown scales at vein 2; a terminal dark velvety line; cilia buff above tornus and below apex. Hind wings fuscous brown; a buff spot above tornus; cilia luteous.

Expanse 23 mm.

*Hab.* Banana River.

*Angitia ligneola*, sp. n.

Palpi, head, collar, and thorax buff; two transverse fuscous lines on collar; patagia outwardly shaded with fuscous brown. Abdomen grey-brown; dorsal buff scales and transverse buff bands. Fore wings buff shaded with brown; base dark lilacine grey, crossed by a brown shade and limited by a black velvety line, incurved below cell, ending near middle of inner margin; orbicular a dark point; reniform large, oval, greyish with a darker line, and edged with whitish buff; a small brown spot on costa before middle; a fine dark line from reniform to inner margin; postmedial fine, fuscous brown, outcurved and finely dentate, followed by a fine, brownish shade, most distinct below costa,

coalescing with a fuscous spot at middle of outer margin, a dark terminal spot above tornus ; apex shaded with grey ; a terminal dark brown line. Hind wings fuscous brown ; reddish and black scales at anal angle; cilia buff, shaded with dark brown on apical half. Fore wings below buff-brown, shaded with fuscous on disc and outer margin. Hind wings below pale buff-brown, shaded with white on inner area.

Expanse 27 mm.

*Hab.* Banana River.

*Angitia grandis*, sp. n.

♀. Palpi brown. Head and collar brown. Thorax mottled dark brown and grey. Abdomen brown with a few darker irrorations. Fore wings dark brown ; a broad post-medial fuscous shade on which a geminate velvety black line is faintly discernible; fuscous streaks above 4 and 5 to termen ; a subterminal white shade between 2 and 4 ; whitish marginal lunules below vein 2, between 3 and 4, and a whitish line subapically ; terminal velvety lunules, inwardly edged with white below vein 4, and with light brown above vein 4; the apical area shaded with grey. Hind wings fuscous brown ; a whitish spot above anal angle; buff spots at veins on cilia.

Expanse 34 mm.

*Hab.* Juan Vinas.

*Mictochroa dolens*, sp. n.

♂. Head, collar, and thorax fuscous brown irrorated with buff-grey ; abdomen dark brown irrorated with whitish grey. Fore wings fuscous brown, darkest medially ; some white irrorations on costal margin, along submedian, and on veins 3 and 4 near cell; antemedial lighter brown, partly edged with velvety black, inbent from median to submedian; orbicular round, lighter brown, edged with velvety black-brown; an indistinct black medial line; reniform large, lighter brown, inwardly edged with velvety black, and with a small white spot behind; postmedial wavily outcurved, light brown partly edged with black-brown, and with whitish points on veins; an irregular subterminal lighter brown line; an interrupted terminal black line. Hind wings dark brown ; a dark discal spot and fine postmedial line.

Expanse 27 mm.

*Hab.* Juan Vinas.

*Mictochroa ambigua*, sp. n.

♂. Frons fuscous brown; vertex, collar, and thorax roseate brown; abdomen grey with darker irrorations. Fore wings roseate brown, thinly irrorated with black; lines fine, black, the antemedial and medial indistinct, the postmedial distinct, finely wavy and outcurved; cilia fuscous. Hind wings fuscous grey; cilia roseate buff mottled with black.

Expanse 26 mm.

*Hab.* Juan Vinas.

*Chalenata noxia*, sp. n.

Palpi, head, collar, and shoulders dark brown; thorax and abdomen creamy white irrorated with brown. Fore wings creamy buff; costa at base and medially shaded with dark brown; traces of an antemedial fine rust-brown line; orbicular a black point; a broad medial shade, widest at end of cell and on costa, its outer edge dentately outcurved beyond cell, dark brown, inwardly shaded with rust-brown, and with a fuscous shade on discocellular; postmedial and subterminal rust-brown spots between the veins, partly suffusing; marginal brown shadings broadest between veins 3 and 5; terminal fuscous spots between the veins; cilia mottled black and grey. Hind wings fuscous grey.

Expanse 20 mm.

*Hab.* Juan Vinas.

*Ozarba agraria*, sp. n.

♀. Head, collar, and thorax lilacine brown, shaded and irrorated with black; abdomen fuscous brown with pale transverse lines. Fore wings brown, palest on outer margin; base shaded with fuscous, with traces of a buff-brown basal line; antemedial buff-brown, outcurved below cell, shaded on either side with fuscous brown; a wavy fuscous-brown geminate medial line; reniform space to costa buff, with a downcurved buff shade between 3 and 4, containing some greyish scales; postmedial buff, incurved, oblique from costa, angled between 7 and 6, and 5 and 4, then wavy to inner margin, edged with fuscous brown, which is velvety outwardly from costa to vein 6, followed by a fuscous-brown shade and a velvety streak between veins 6 and 7 to subterminal; subterminal fine, buff, wavy, followed by a velvety brown-black spot at apex; a dark terminal line, somewhat

interrupted at veins ; cilia mottled light and fuscous brown. Hind wings fuscous brown ; cilia tipped with white.

Expanse 23 mm.

*Hab.* Tuis.

*Bryocodia poasina*, sp. n.

Palpi, head, collar, and thorax black, thinly mottled with buff ; abdomen buff, dorsally shaded with fuscous brown and with fuscous dorsal tufts. Fore wings dark brown, the medial space almost black ; some reddish irrorations on basal space ; antemedial geminate, velvety black filled in with buff-grey, and slightly irrorated with dark red ; a dark leaden-grey spot in cell and one below it, both outwardly edged by a curved velvety-black shade ; a buff-grey line above reniform, which is also buff-grey, crossed by a fuscous line, sometimes strongly irrorated with white, and followed by a fuscous shade in curve formed by postmedial, which is also buff-grey, followed by a fuscous line from costa to vein 3, and sometimes on inner margin by white ; terminal area irrorated with reddish ; a subterminal fuscous shade, partly edged with buff-grey and sometimes with white ; terminal velvety-black spots separated by buff points ; cilia fuscous grey, with faint buff streaks at veins. Hind wings fuscous ; the costal margin whitish ; a dark discal spot and postmedial line ; terminal dark spots ; cilia light reddish. Hind wings below white, thinly irrorated with fuscous ; a round black discal spot ; a dentate postmedial line and interrupted black terminal line.

Expanse 24 mm.

*Hab.* Volcano Poas.

*Bryocodia saniva*, sp. n.

♀. Head, collar, and thorax buff mottled with brown ; abdomen buff irrorated with brown. Fore wings brown, shaded with buff at end of cell and on postmedial area ; an antemedial buff line, partly edged with fuscous scales, and nearly straight from costa to inner margin, followed by a lilacine-rust shade in and below cell and an indistinct pale angled line ; end of cell fuscous brown, the discocellular broadly whitish buff, irrorated with ochreous and rust-brown ; the postmedial whitish, outcurved and wavy beyond cell, slightly incurved below vein 3, edged with fuscous brown, and irrorated with ochreous buff from below vein 4 ; a dark brown space on costa before apex ; a dark line from postmedial between 5 and 6, expanding on outer margin ; some

terminal darker shadings above tornus ; cilia mottled ochreous and dark brown. Hind wings fuscous grey, showing the black discal spot and finely dentate postmedial line of underside ; cilia yellowish.

Expanse 28 mm.

*Hab.* Juan Vinas.

NEOCODIA, gen. nov.

Proboscis fully developed ; palpi upturned, the second joint to middle of frons, moderately scaled, the third moderate ; frons smooth ; eyes large, round ; antennæ of female ciliated ; thorax clothed almost entirely with scales, the prothorax without crest, the metathorax with spreading crest ; tibiæ moderately fringed with hair ; abdomen with dorsal crests on two basal segments. Fore wing with the apex rounded, the termen somewhat excised below apex and excurved at middle, not crenulate ; veins 3, 4 stalked ; 5 from just above angle of cell ; 6 from below upper angle ; 7, 8, 9, 10 stalked ; 11 from cell. Hind wing with veins 3, 4 stalked ; 5 nearly fully developed from well above angle of cell ; 6, 7 from upper angle ; 8 anastomosing with the cell near base only.

Type of genus, *Neocodia asna*.

*Neocodia asna*, sp. n.

♀. Palpi and head grey ; collar and thorax grey shaded with ochreous brown ; abdomen above brown, with dorsal ochreous tufts at base. Fore wings : basal half white, crossed by a basal and antemedial dull brown line, and with a broader similar shade between them ; outer half olive or ochreous brown according to light ; a fine dark postmedial line shaded with white ; the apex broadly buff suffused with golden brown ; an irregular subterminal black shade suffusing with a black spot on outer margin between veins 4 and 5. Hind wings fuscous brown, thinly scaled at base ; cilia buff-grey with some fuscous shadings.

Expanse 17 mm.

*Hab.* Guapiles, Sixola.

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XIII.—*List of small Mammals obtained by Mr. G. Fenwick Owen on the Upper Gambia and in Fouta Djallon.* By OLDFIELD THOMAS.

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DURING the early part of 1910 Mr. G. Fenwick Owen made an expedition to Western Africa in search of large game,

with the especial wish to obtain a male Derby's eland for the National Museum. In this latter purpose he was unsuccessful, but he brought home a female eland, besides specimens of the local buffalo, hartebeest, water-buck, roan antelope, oribi, and blue-backed duiker.

Of small mammals he obtained a considerable series, and these prove to be of such interest as to deserve a special list, in addition to the descriptions already published of *Tatera gambiana*, *Arvicanthis linulus*, and *Uranomys oweni**.

Mr. Fenwick Owen's collecting was mostly done in French Gambia, on the upper part of the river of that name; but some of the specimens came from rather further south, in the Fouta Djallon district of French Guinea—a region about 3000–4000 feet in altitude. More complete collections from this latter region might prove of great interest.

Mr. Owen was accompanied by Mr. G. Russell Roberts, who assisted in making the collection.

The whole series has been presented to the National Museum by Mr. Owen, and forms a very valuable addition to its African collections.

1. *Cercopithecus büttikoferi*, Jent.

♂. No exact locality.

2. *Cercopithecus patas*, L.

♂. B. 41. Serekali, French Guinea. 3000′.

3. *Cercopithecus sabœus*, L.

♂. B. 30. Sigon, French Guinea. 3500′.

4. *Cercocebus fuliginosus*, Geoff.

♀ (young). B. 35. Daley, Fouta Djallon. 3000′.

5. *Hipposideros gigas gambiensis*, K. And.

*B.* 23. Marakissa. 300′.

6. *Petalia* sp.

Five specimens. Dialacote, Gambia. 50′.

7. *Scotophilus nigritellus*, de Wint.

♂. A. 64. Near Badi, Gambia. 40′.

* Ann. & Mag. Nat. Hist. (8) vi. pp. 428–431 (1910).

A rare bat, only previously known from one specimen obtained by Capt. Giffard at Gambaga.

8. *Scotæcus albofuscus*, Thos.

♂. Near Badi, Gambia. 100′.

9. *Crocidura cinderella*, sp. n.

♀. A. 43. Gemenjulla, French Gambia. 50′. 18th March, 1910. B.M. no. 11. 6. 10. 13. *Type.*

A very small drab-grey species.

Size among the smallest of the genus. Fur close and fine; hairs of back about 3–3·5 mm. in length. General colour above pale grey (rather less drab than Ridgway's "drab-grey"). Under surface cinereous, the tips of the hairs greyish white, or with a slight creamy tinge, their bases slaty. Hands and feet white. Tail of medium length, thick at base, tapering terminally, the long bristle-hairs numerous; grey above, lighter below.

Skull small, its brain-case narrow in proportion. Second and third upper unicuspids equal in area.

Dimensions of the type (measured in flesh) :—

Head and body 62 mm.; tail 48; hind foot 11.

Skull: condylo-incisive length 19·6; anterior breadth 6; interorbital breadth 3·8; mastoid breadth 8·2; upper tooth series 8·1.

*Hab.* and *Type* as above.

No West-African shrews of this type seem to have been hitherto described. From Morocco de Winton's *C. whitakeri* is perhaps allied, but is of a whiter grey and has a shorter muzzle.

10. *Viverra civetta*, L.

♂. No exact locality.

♀. B. 34. Daley, Fouta Djallon. 3500′.

11. *Genetta genettoides*, Temm.

♀. B. 40. Fouta Djallon. 2500′.

♀ (young). A. 27. Badon.

12. *Heliosciurus gambianus*, Og.

♀. B. 24, B. 26. Marakissa, French Gambia. 500′.

♀. B. 37, B. 39. Daley, Fouta Djalon, French Guinea. 3000′.

13. *Euxerus erythropus*, Geoff.

♂. B. 32, B. 36. Daley, Fouta Djalon. 3000′.

14. *Tatera guineæ*, Thos.

Twelve specimens, various localities.

Described in 1910* on specimens obtained by Dr. W. J. Ansorge in Portuguese Guinea.

15. *Tatera gambiana*, Thos.

♂. B. 14, 17, 18. Marakissa, Gambia. 500′.

♂. B. 12, 15, 20 miles N.E. of Keduga, Gambia. 450′.

Described last year from this series, no. B. 14 (B.M. no. 11. 6. 10. 36) the type.

16. *Taterillus gracilis*, Thos.

Six specimens. Gemenjulla, French Gambia. 50′.

Four, Gamon. 100′.

17. *Arvicanthis setosus*, Thos.

Nine specimens. Gemenjulla. 50′.

♀. A. 87. Gamon. 100′.

The type and only previously known specimen of this species was obtained by Capt. Gifford in the Fra-Fra country, Northern Territory of the Gold Coast.

18. *Arvicanthis oweni*, sp. n.

8 specimens. Gemenjulla, French Gambia. 50′.

A small striped species of the *barbarus* group.

Quite similar in external appearance, number and relative prominence of stripes, and general colour to the Upper Nile *A. zebra*, Heugl., as represented by a specimen from Fashoda. Light stripes whitish or pale cream-colour, not the stronger buffy of *A. dunni*. Under surface white. Ears buffy. Hands and feet whitish, with buffy metapodial patches. Tail long, black along its upper surface, buffy on sides and below.

Skull agreeing in size with that of *A. dunni*, but the teeth rather and the bullæ conspicuously smaller. The latter are about as in *A. zebra*, in which animal the skull is considerably larger.

* Ann. & Mag. Nat. Hist. (8) v. p. 353.

Dimensions of the type (measured in flesh) :—

Head and body 105 mm.; tail 114; hind foot 22; ear 14.

Skull: greatest length 27·2 ; condylo-incisive length 24·7 ; zygomatic breadth 12·5 ; interorbital breadth 4·3 ; breadth of brain-case 11·7 ; palatilar length 11·8 ; palatal foramina 5·8 ; greatest horizontal diameter of bulla 5·5 ; length of upper molar series 4·8.

*Hab.* As above.

*Type.* Adult male. B.M. no. 11. 6. 10. 61. Original number A. 72. Collected 14th April, 1910.

This is the first *Arvicanthis* of the *barbarus* group to be found in West Africa. It is strikingly like the *A. zebra* of the Egyptian Soudan, but has a smaller skull. From *A. dunni* of the same region it differs by its less buffy colour and smaller bullæ.

I have named this beautiful little animal in honour of its discoverer, to whom the National Museum is indebted for the donation of the present valuable collection.

### 19. *Arvicanthis linulus*, Thos.

Ann. & Mag. Nat. Hist. (8) vi. p. 429 (1910).

♂. A. 80. Gamon, French Gambia. 100′. B.M. no. 11. 6. 10. 69.

♂. A. 46. Gemenjulla, French Gambia. 50′.

♂. No exact locality.

General appearance as in *A. dorsalis*, but with faint indications of a light lateral banding.

Now that the skins of this interesting species have been remade, they show on the shoulders and flanks indications of a light spotted banding, apparently corresponding to the prominent banding found in the *A. striatus* group. Indistinct lighter spots are, however, often found in the lighter forms of true *A. dorsalis*, and in *A. linulus* these are unusually evident and in linear series.

The skull has a comparatively broad interorbital region, as in *A. striatus*.

### 20. *Epimys daltoni*, Thos.

♂. B. 1. Upper Nicola Coba, Gambia. 500′.

♂. A. 75. Diakaba, Gambia. 100′.

This species was originally described as from "West Africa—probably Fernando Po," but the close resemblance that Mr. Fenwick Owen's specimens bear to the type seems

to indicate that the latter was obtained in the Gambia, where Mr. Dalton also collected.

*C. daltoni* is a pale local representative of the group with 3—2=10 mammæ, just as *E. gambianus*, found with it, represents the multimammate species.

21. *Epimys* sp.

Sixteen specimens. Gemenjulla, Gambia.

A large grey-brown multimammate species; perhaps *E. erythroleucus*, Temm.

22. *Epimys* sp.

♂. A. 10. Talicori, French Gambia.

Without a female example, to indicate the mammary formula, I do not venture definitely to determine this specimen.

23. *Epimys gambianus*, sp. n.

Twelve specimens from various localities in French Gambia.

A small fawn-coloured or sandy member of the multimammate group.

General appearance very much as in the Upper Nile *E. blainei*, Wrought. Colour of upper surface sandy fawn, as in desert animals commonly, very different from the usual grey or brown of the other multimammate species. Under surface creamy white, the bases of the hairs slaty grey. Ears large, though rather smaller than in *E. blainei*, greyish brown, their minute hairs white. Hands and feet white. Tail rather longer than head and body, fairly well haired, grey-brown above, whiter below.

Skull about as in *E. blainei*.

Dimensions of the type (measured in flesh) :—

Head and body 95 mm.; tail 97 ; hind foot 22; ear 17.

Skull : tip of nasals to back of parietals 25; upper molar series 5·1.

An older and more perfect skull measures :—

Greatest length 28·2 ; condylo-incisive length 26·1 ; interorbital breadth 4·2; breadth of brain-case 12 ; palatilar length 12·2 ; palatal foramen 6·7 ; upper molar series 5.

*Hab.* of type. Gamon, French Gambia. 100′.

*Type.* Adult male. B.M. no. 11. 6. 10. 87. Original number A. 77. Collected 9th April, 1910.

This species, while quite unlike all the other multimammate forms, is extremely similar to *E. blainei* of the Egyptian

Soudan, but differs by its rather shorter ears, longer tail, and slightly paler coloration. The two species *E. gambianus* and *E. daltoni* evidently stand to each other in the same relationship that *E. blainei* and *E. butleri* do on the Nile, and it is possible that links will prove to connect the corresponding species when the intermediate country is explored.

A specimen of this species has been in the Museum since 1844, where it was obtained by Whitfield and presented by Lord Derby. At one time it was labelled "*Mus gambianus*," and though I cannot find that this name was ever published, I think it wiser to use the same term, in case I have overlooked it.

### 24. *Uranomys oweni*, Thos.

Ann. & Mag. Nat. Hist. (8) vi. p. 431.

♂. B. 25. Marakissa, Gambia. 500′. B.M. no. 11. 6. 10. 99. *Type.*

♂. A. 95.

This is the most interesting animal of the collection, as it belongs to a genus only previously represented by a single Central African species, *U. ruddi*, Dollm., and it forms therefore quite a fresh addition to the West African fauna. A description of it was published last year (*l. c.*).

### 25. *Procavia oweni*, sp. n.

♀. B. 42. Nr. Daley, Fouta Djalon. 3000′. 19th June, 1910. B.M. no. 11. 6. 10. 101. *Type.*

A large hypsodont species with orange-buffy dorsal spot.

Size large. Fur short, of medium texture. General colour above between "raw umber" and "bistre." Under surface broadly washed with clear clay-colour, the bases of the hairs slaty; chin and throat mixed brown and buffy. Face much blackened, but everywhere slightly speckled, not deep black. Backs of ears blackish, a spot behind them and the sides of the neck more or less buffy. Dorsal spot oval, its hairs ochraceous buff throughout, not darker at base. Arms and hands, legs and feet coarsely mixed brown and buffy, the hairs edging the digits strongly buffy.

Dentition about as in *P. lopesi*.

Dimensions of the type (in Stage VI.) (measured in flesh):—

Head and body 510 mm.; hind foot 79; ear 34.

Front of incisors to back of $m^2$ 54; breadth of $m^1$ 8·1; front of $p^1$ to base of $m^2$ 36.

*Hab.* and *Type* as above.

This fine Dassie is quite unlike any of the described W. African members of the genus, but presents considerable resemblance to *P. lopesi*, Thos. & Wrought., a native of Monbuttu, in the eastern part of the Congo Forest area. It is, however, rather more buffy throughout, and its hands and feet especially are markedly more buffy than in *P. lopesi*, where they are greyish brown.

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## XIV.—*New and interesting Mammals from East Africa.*

By Guy Dollman.

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### *Cricetomys gambianus luteus*, subsp. n.

A large light-coloured form allied to *C. gambianus kenyensis*, Osg.

Size of body large; general proportions about as in the other members of this group. General colour of back greyish brown tinged with buff. Hairs of back with pale slate-grey bases, darkening to brownish in the apical halves; tips light buff-coloured or brown. A large number of pure white hairs interspersed among the brown ones, apparently due to senility. Muzzle and head pale grey washed with buffy white. Sides of face and neck white tinged with buff; hairs with slate-grey bases and light tips. Flanks buff-coloured; hairs with brownish-red or grey bases and buff tips. Backs of hands and feet grizzled brownish red; toes thinly clad with white hairs. Under surface of body buffy white; hairs of belly with pale greyish bases and white tips. Tail with terminal two-fifths of its length white.

Skull larger than that of the allied forms, equalling *C. ansorgei* in general proportions.

Dimensions of the type (measured in the flesh) :—

Head and body 462 mm.; tail 381; hind foot 73; ear 46.

Skull: greatest length (condylo-nasal) 80; basilar 65; condylo-incisive 74·6; zygomatic breadth 36·2; interorbital breadth 11·5; occipital breadth 28; greatest length of nasals 33; palatilar length 38·4; diastema 26; length of palatal foramina 9·3; length of upper molar series 12·2.

*Hab.* Igembi Hills, N.E. of Mt. Kenya. Altitude 6000 feet.

*Type.* Old female. Original number 1894. Collected on February 12th, 1911.

The very much larger skull and lighter-coloured pelage are the chief points that distinguish this new form from the allied race, *C. gambianus kenyensis.*

*Acomys kempi,* sp. n.

♂. 1735; ♀. 1736. Chanler Falls, Eusso Nyiro.

Related to *A. ignitus*, Dollm., but very much paler in colour and with a longer tail.

Size of body rather less than in *A. ignitus,* skull considerably smaller. Tail comparatively long. General colour of upper surface pale orange-buff, washed with pale slate-grey down the middle of the back. Flanks pale orange-buff (between yellowish salmon no. 1 and cinnamon no. 1, 'Répertoire de Couleurs'), very faintly speckled with brownish, the general effect very like that occurring in *A. witherbyi,* de Wint. As in *A. ignitus* and the other allied species, the buffy tint on the flanks is sharply marked off from the white underparts. Nasal region and forehead washed with slaty grey. Backs of hands and feet dirty white. Ventral surface white. Tail long and with well-marked dorsal and ventral surfaces; caudal hairs as in *A. ignitus.*

Skull smaller than that of *ignitus*, with a narrow brain-case; zygomatic arches almost parallel; auditory bullæ small and uninflated, markedly different to the bullæ of *ignitus.*

Dimensions of the type (measured in the flesh) :—

Head and body 103 mm.; tail 106; hind foot 16; ear 17.

Skull: greatest length 28·4; basilar length 21·5; condylo-basilar length 23·7; condylo-incisive length 25·5; zygomatic breadth 12·5; interorbital breadth 4·5; breadth of brain-case (across squamosal region) 12; length of nasals 11; width of palate (inside $m^1$) 3; length of palatal foramina 6·5; length of upper molar series 4.

*Hab.* Chanler Falls, Eusso Nyiro. Altitude 3000 feet.

*Type.* Adult female. Original number 1736. Collected on January 18th, 1911.

This species is distinguished from *A. ignitus* by its far paler colour, longer tail, and very much smaller skull with less inflated bullæ. In general colour it most nearly resembles *A. witherbyi,* a species described by de Winton from El Kowa, Soudan, but the dimensions of the two animals

are considerably different. The same applies in the case of *A. hystrella*, recently described from Nimule, Uganda, by Heller, the tail in the Nimule species being markedly shorter and the general colour of the animal a great deal richer.

*Acomys percivali*, sp. n.

♂. 1742, 1756, 1762; ♀. 1743, 1744, 1747, 1749. Chanler Falls. Eusso Nyiro.

A dark slate-coloured species rather smaller than *A. kempi* described above.

Size rather less than *kempi* or *ignitus*. Feet and ears small. Dorsal spines long and stout, more so than in *kempi*, resembling in this respect *Acomys witherbyi*, de Wint. General colour of dorsal surface dark slaty brown (dark neutral tint no. 1, 'Répertoire de Couleurs'), some of the spines tinted with rufous, in one specimen to such an extent as to give the animal a reddish-grey appearance. Flanks, sides of head and neck similar in colour to back. Line of demarcation between dorsal and ventral surfaces less sharply defined than is usually the case in this genus. Backs of hands and feet dirty white, conspicuously grizzled with slaty brown, a feature that is very evident on the hind feet and markedly different from the white feet of the allied species. Ventral surface pure white tinted with slaty grey, many of the hairs having pale slate-coloured bases and annulations; the grey tint most evident on the throat. Tail dark brown above and greyish brown below, the bi-coloured effect not very marked. Hairs on tail quite short; black above, silver-grey below.

Skull small and narrow, with comparatively long nasal region and small brain-case. Auditory bullæ small and rather flat.

Dimensions of the type (measured in the flesh) :—

Head and body 94 mm.; tail 85; hind foot 15; ear 15.

Skull: greatest length 27·5; basilar length 21·5; condylo-incisive length 25·5; zygomatic breadth 12·7; inter-orbital breadth 4·5; breadth of brain-case (across squamosal region) 11·9; length of palatal foramina 7·4; width of palate (inside $m^1$) 2·7; length of upper molar series 4.

*Hab.* Chanler Falls, Eusso Nyiro. Altitude 3000 feet.

*Type.* Old male. Original number 1762. Collected by Messrs. Percival and Kemp on January 23rd, 1911.

The unusually dark colour of the pelage of this *Acomys* distinguishes it at once from the allied forms. It is quite probable that specimens of this species occur in which the

reddish tint is much more evident. At the same time, in a series of twelve specimens from the type locality the slate-grey colour is dominant. In addition to the general grey tint of the dorsal surface, the speckled feet, greyish-white belly, dark tail, and the small size of the skull are all characters that serve to distinguish this *Acomys* from the other East African species of this group.

*Acomys pulchellus*, sp. n.

♀. 1757, 1776. Chanler Falls, Eusso Nyiro.

A small species resembling *A. kempi* in general colour, but with the spines on the dorsal surface shorter and more slender.

In size and general proportions about as in *A. percivali*; tail rather longer. Hair on back composed of slender spines, those on the hind-quarters and rump markedly thinner and shorter than in the two species described above. General colour of dorsal surface very much as in *A. kempi*, darker on the head and down the middle of the back. Flanks richer and darker in colour (between tan colour no. 1 and snuff-brown no. 4, 'Répertoire de Couleurs'), the buff tint sharply marked off from the white belly. Backs of hands and feet white. Entire underparts white. Tail as in *A. kempi*.

Skull rather smaller than that of *kempi*, with a comparatively broad brain-case and short nasals.

Dimensions of the type (measured in the flesh):—

Head and body 84 mm.; tail 94; hind foot 15; ear 15.

Skull: greatest length 28; basilar length 21; condylo-incisive length 25·3; zygomatic breadth 12·2; interorbital breadth 4·5; breadth of brain-case (across squamosal region) 12·5; length of nasals 10·9; width of palate (inside $m^1$) 3; length of palatal foramina 6·1; length of upper molar series 4.

*Hab.* Chanler Falls, Eusso Nyiro. Altitude 3000 feet.

*Type.* Adult female. Original number 1776. Collected by Messrs. Kemp and Percival on January 24th, 1911.

The small size of this species, together with the short and slender spines on the dorsal surface, distinguishes it from all the other East African members of the genus.

*Acomys ablutus*, sp. n.

A small species related to *Acomys wilsoni*, Thos., but distinguished by its smaller size and less rufous colouring.

Size small; hind foot markedly smaller than that of *A. wilsoni*. General colour of back dull buff washed with brownish black, the dark tint more dominant down the middle of the back. Flanks rather purer and more buffy in colour, speckled over with brownish-slate colour, the general effect much greyer and duller than in *wilsoni*, where the flanks are pure rufous buff with hardly any dark speckling. Face and back of head slaty brown, faintly speckled with pale buff. Sides of face pale dirty buff. Lips white. Backs of hands and feet and entire under parts white; hairs of belly white to roots. Tail, as in *A. wilsoni*, greyish brown above and silvery grey below.

Skull much smaller and slighter than that of *A. wilsoni*, with markedly shorter nasals and narrower brain-case. Auditory bullæ less inflated and smaller. Cheek-teeth conspicuously smaller.

Dimensions of the type (measured in the flesh) :—

Head and body 77 mm.; tail 55; hind foot 12·5; ear 13. Skull: greatest length 22·7; basilar length 17·5; condylo-incisive length 20·7; zygomatic breadth 10·6; interorbital breadth 4; breadth of brain-case (across squamosal region) 10·2; length of nasals 9; length of palatal foramina 5·4; length of upper molar series 4.

*Hab.* Nyama Nyango, Eusso Nyiro. Altitude 3200 feet.

*Type.* Adult male. Original number 1820. Collected on January 30th, 1911.

The smaller size and much less rufous colouring readily distinguish this Eusso Nyiro *Acomys* from the Mombassa species, *A. wilsoni*.

*Arvicanthis massaicus*, Pagenst.

♂. 1441, 1442, 1449, 1453, 1455, 1465, 1494, 1509, 1513; ♀. 1456, 1460, 1468, 1479, 1493, 1495, 1510, 1512. Rumruti, Laikipia Plateau.

*Arvicanthis pumilio*, Sparr.

♂. 1580, 1581, 1585, 1587, 1600, 1606, 1609, 1623, 1628, 1634, 1640, 1683; ♀. 1584, 1588, 1599, 1602, 1607, 1616, 1638, 1643, 1645, 1652, 1669. Solai, Mt. Kenya.

*Arvicanthis rumruti*, sp. n.

♂. 1413, 1432, 1440, 1457; ♀. 1415, 1416, 1426, 1444, 1456. Rumruti, Laikipia Plateau.

A small light-coloured species allied to *A. abyssinicus præceps*, Wrought.

Size rather small, not very much larger than *A. somalicus*, Thos. General colour of upper surface pale greyish brown, faintly tinted with a light straw-coloured wash, but not in any way approaching the buffy coloration of *A. abyssinicus præceps*. Face and head greyish; muzzle not markedly buff-coloured. Ocular rings pale buff, much less evident than in the allied forms. Ears clothed with short grey hairs, faintly tinted with buff; a character that at once distinguishes this species from the Somaliland *Arvicanthis*, in which the ears are bright orange. Flanks paler and greyer than back, the grey tint passing fairly abruptly into the white of the ventral surface. Backs of hands and feet greyish, faintly washed with pale buff. Under surface of body white, hairs with grey bases and white tips. Tail as in *A. a. præceps*, the ventral surface rather less buffy.

Skull small, in size hardly greater than that of *A. somalicus*; molar teeth much smaller than in the allied species.

Dimensions of the type (measured in the flesh):—

Head and body 129 mm.; tail 92; hind foot 27; ear 17.

Skull: greatest length 31·8; basilar length 26·1; condylo-incisive length 30; zygomatic breadth 16; interorbital constriction 4·3; breadth of brain-case (across squamosal region) 13·2; length of nasals 12; palatilar length 14·3; length of palatal foramina 7; width of palate (inside $m^1$) 2·5; postpalatal length 11·7; length of upper molar series 5·9.

*Hab.* Rumruti, Laikipia Plateau. Altitude 6,500 feet.

*Type.* Old male. Original number 1413. Collected on October 25th, 1910.

This Rumruti *Arvicanthis* is at once recognized by its small size and the exceedingly pale colour of the pelage. The white under surface is a further character that serves to distinguish this species from the Naivasha race of *abyssinicus, A. a. præceps.*

It is interesting to note that Mr. Kemp found *A. abyssinicus præceps* living side by side with this small greyish species, and further, that a series of specimens collected at Baringo appear also to represent the Naivasha species.

*Arvicanthis reptans*, sp. n.

A small form allied to *A. somalicus*, Thos.

Size rather less than in *somalicus*. General colour of dorsal surface pinkish brown speckled with black, the black tint most evident down the middle of the back. Flanks purer in colour than back, the general effect more buffy; buff tint of flanks sharply differentiated from the white belly.

Hairs of back with black bases, buff-coloured subterminal rings, and dark tips. Head and face much the same colour as back. Ocular rings, nose, and ears bright orange-buff. Backs of hands and feet light buffy orange. Under surface of body greyish white tinted with buff; the buff tint in some cases almost entirely absent. Tail as in *A. somalicus*, dark blackish brown above and light buff below.

Skull like that of *somalicus* but smaller and less elongate. Molar teeth rather small.

Dimensions of the type (measured in the flesh) :—

Head and body 113 mm.; tail 89; hind foot 25; ear 13.

Skull: greatest length 29; basilar length 24; condylo-incisive length 26; zygomatic breadth 16; interorbital constriction 4·8; breadth of brain-case (across squamosal region) 12; length of nasals 11; palatilar length 12·5; length of palatal foramina 6; length of upper molar series 6.

*Hab.* Nyama Nyango, Eusso Nyiro. Altitude 3000 feet.

*Type.* Old male. Original number 1787. Collected on January 25th, 1911.

The darker and richer colour of the pelage, together with the smaller size, are the chief characters that distinguish this species from the Somaliland form.

*Arvicanthis chanleri*, sp. n.

A large-sized species of the *somalicus* group.

In general colour very much as in the foregoing species, rather lighter and yellower. Ears, nose, ocular rings, and backs of hands and feet buffy orange. Flanks washed with a rich buffy tint. Ventral surface white tinged with buff. Tail as in *somalicus*.

Skull much larger than that of *somalicus*, in general proportions equalling the *abyssinicus* group.

Dimensions of the type (measured in the flesh) :—

Head and body 131 mm.; tail 122; hind foot 25 ear 14·5.

Skull: greatest length 34; basilar length 27; condylo-incisive length 31; zygomatic breadth 17; interorbital constriction 4·8; breadth of brain-case (across squamosal region) 12·4; length of nasals 11·7; palatilar length 14·2; length of palatal foramina 6·6; length of upper molar series 6·5.

*Hab.* Chanler Falls, Eusso Nyiro. Altitude 3000 feet.

*Type.* Adult female. Original number 1769. Collected January 23rd, 1911.

This species is readily distinguished from both *somalicus* and the form described above by its far greater size, a character that is very evident on examination of the skulls.

*Lophiomys ibeanus hindei*, Thos.

♂. 1539, 1651, 1665; ♀. 1535, 1564, 1650, 1666. Solai, Mt. Kenya.

*Lepus victoriæ*, Thos.

♂. 1328, 1347, 1350, 1362, 1374, 1379, 1382, 1398; ♀. 1322, 1323, 1329, 1334, 1341, 1348, 1361, 1381. Baringo.

♂. 1417, 1433, 1436; ♀. 1427, 1428, 1429, 1435, 1437. Rumruti, Laikipia Plateau.

*Lepus crawshayi*, Thos.

♂. 1418, 1419; ♀. 1430. Rumruti, Laikipia Plateau.

*Dendrohyrax crawshayi laikipia*, subsp. n.

♂. 1447, 1452, 1476, 1511; ♀. 1446, 1505. Rumruti, Laikipia Plateau.

A pale-coloured race of the Kenya species *D. crawshayi*, Thos.

Size and general proportions as in *D. crawshayi*. General colour of dorsal surface greyish brown tinged with yellow, the general effect much paler and less tawny than in *crawshayi*. Hairs of back slaty brown with blackish tips; subterminal rings pale yellowish white. Dorsal spot as in *crawshayi*. Sides of face and neck grey, hairs with brownish bases, white subterminal rings, and dark tips. Muzzle and crest on head brownish. Flanks very similar in colour to back, strikingly different from the dark tawny coloration met with in *D. crawshayi*. Backs of hands and feet grey washed over with blackish brown. Underparts white faintly tinted with pale buff. Hairs of belly white with pale greyish bases. Throat and underside of neck rather darker than rest of ventral surface, hairs slaty brown with white tips. Chin brownish grey speckled with white.

Skull like that of *D. crawshayi*.

Dimensions of the type (measured in the flesh):—

Head and body 477 mm.; hind foot 66·5; ear 32.

Skull: basal length 88; condylo-incisive length 95; zygomatic breadth 56·6; length of nasals 24; greatest width across nasals 20·5; palatal length 49; width of palate

(inside $m^1$) 16·5; post-palatal length 40; length of maxillary tooth-row 37.

*Hab.* Rumruti, Laikipia Plateau. Altitude 6000 feet.

*Type.* Adult male. Original number 1476. Collected on November 4th, 1910.

This Laikipia Dassie is distinguished from the Kenya form by its far paler colour, both of the dorsal and ventral surfaces.

Mr. Kemp, while collecting on the Aberdare Mountains in the early part of last year, obtained several specimens of *Dendrohyrax*, and these appear to be quite similar to the Laikipia series and may be regarded as representatives of the same race.

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## XV.—*New Genera and Species of* Cicadidæ.

By W. L. Distant.

### Genus Rihana.

*Rihana*, Dist. Ann. & Mag. Nat. Hist. (7) xix. p. 426 (1904).

Type, *R. ochracea*, Walk.

### *Rihana numida*, sp. n.

Head and pronotum black; head with a basal triangular spot, an apical spot and the transverse lateral carinations to front, lateral margins, ocelli, and irregular spots between ocelli and eyes on vertex, dull reddish; pronotum black, much suffused with dull reddish, basal and lateral margins ochraceous, interiorly narrowly margined with black; mesonotum black, the lateral margins, the margins of two central obconical spots connected with anterior angles of basal cruciform elevation, which is of the same colour, dull reddish, anterior angle of cruciform elevation annulated with black; margins of mesonotum ochraceous; abdomen above black, a greyish spot on each side of second abdominal segment, anal segment reddish ochraceous at base, with a central black spot; body beneath and legs ochraceous; face and abdomen more testaceous, the former with the interspaces between the transverse carinations black; sternum and lateral abdominal margins somewhat longly palely pilose; tegmina and wings hyaline, the former on basal two-thirds moderately tinted with ochraceous, the costal membrane and

venation ochraceous, darker towards apex, wing-venation similarly coloured; length of head more than half the breadth of space between eyes; face convexly prominent; opercula not reaching the basal abdominal segment, moderately overlapping at their inner margins, apices broadly convexly rounded, the margins distinctly reflexed; rostrum reaching the posterior coxæ.

♂. Long., excl. tegm., 26 mm.; exp. tegm. 73 mm.
♀. „ „ 23 „ „ 75 „
*Hab.* China (♂, Brit Mus.; ♀, Geneva Mus.).

### Genus Cryptotympana.

*Cryptotympana*, Stål, Ann. Soc. Ent. Fr. (4) i. p. 613 (1861).

Type, *C. pustulata*, Fabr.

#### *Cryptotympana viridipennis*, sp. n.

♂. Head black, between front and vertex a transverse fasciate series of ochraceous hairs; pronotum black, the anterior margin narrowly, the posterior margin broadly, a central longitudinal fascia neither reaching anterior nor posterior margins, and an oblique fascia between the incisures, greenish ochraceous; mesonotum greenish ochraceous, four obconical spots proceeding from the anterior margin (the two central spots shorter), the lateral margins (excluding apex), and a spot at each anterior angle of the basal cruciform elevation black; abdomen above and tympana black; body beneath and legs black; intermediate and posterior femora above more or less castaneous, posterior tibiæ with a pale annulation near base; sternum thickly ochraceously pilose; tegmina and wings hyaline, the former for less than half from base to apex, and the latter for more than half from base to apex, olivaceous green, the bases of both tegmina and wings black; opercula reaching the base of the fourth abdominal segment, their lateral margins and apex more or less ochraceous, inner margins divergent, concavely sinuate, apices roundly angulated; face with a central ochraceous longitudinal line at base, the transverse striations ochraceously pilose.

♂. Long., excl. tegm., 44 mm.; exp. tegm. 146 mm.
*Hab.* Sumatra; Battak Mts. (Brit. Mus.).

### Genus Proarna.

*Proarna*, Stål, Stett. ent. Zeit. xxv. p. 61 (1864).

Type, *P. hilaris*, Germ.

*Proarna venosa.*

*Prunasis venosa*, Uhler, Ent. Amer. iv. p. 82 (1888); Dist. *Prunasis*, Syn. Cat. Hom., Cicad. p. 152 (1906).

*Hab.* Texas; Dallas (Geneva and Brit. Mus.).

Genus Pacarina.

*Pacarina*, Dist. Ann. & Mag. Nat. Hist. (7) xv. p. 314 (1905).

Type, *P. signifera*, Walk.

*Pacarina signifera.*

*Cicada signifera*, Walk. List Hom., Suppl. p. 22 (1858).
*Pacarina signifera*, Dist. Syn. Cat. Homop., Cicad. p. 89 (1906).

This species I only previously knew from Central America. The Geneva Museum possesses a series of specimens taken at Dallas, Texas. Some of these agree with the typical form, others have the spots to the mesonotum nearly confluent, thus giving it an almost black appearance. Others, apparently bleached specimens, have nearly all the macular markings obliterated, including those on the tegmina.

Genus Selymbria.

*Selymbria*, Stål, Ann. Soc. Ent. Fr. (4) i. p. 615 (1861).

Type, *S. stigmatica*, Germ.

*Selymbria pandora*, sp. n.

♂. Body above dull ochraceous, abdomen more testaceous; head with the area of the ocelli, and a large semicircular spot occupying the whole base of front, black; pronotum with two curved discal black lines on each side; mesonotum with four obconical spots at anterior margin, the two central spots shortest and only margined with black, the lateral spots largest and irregularly black, a branched triangular spot in front of the basal cruciform elevation, a spot in front of each anterior angle of the latter, and a basal lateral marginal spot, black; head beneath, sternum, and legs ochraceous; face and tarsi castaneous, the former very strongly blackly sulcate from a little before base to apex, the transverse carinations also black, between face and eyes the head is very thickly greyishly pilose; tegmina and wings pale

hyaline, both narrowly testaceous at their bases, venation and costal membrane to tegmina pale greenish.

♀. Head, pronotum, and mesonotum olivaceous green; area of the ocelli black; carinations and a basal central spot to front, lateral areas of vertex before eyes, an oblique space on each side of pronotum between the fissures and behind eyes, two obconical anterior spots, a central basal lanceolate spot, a marginal basal spot, and a small spot at each anterior angle of the basal cruciform elevation on mesonotum, pale castaneous or piceous; abdomen dull ochraceous; head beneath, sternum, and legs pale greenish; abdomen beneath dull ochraceous; tegmina and wings pale hyaline, both narrowly testaceous red at base, costal membrane and veins of tegmina and wings pale greenish; head (including eyes) broader than base of mesonotum, front a little longer than vertex, their margins not continuous, a short linear central impression at base of front, a similar but broader impression at base of vertex; body above finely, irregularly, palely pilose; face beneath centrally piceous, the transverse carinations pale castaneous; basal and lateral margins and apex of clypeus piceous; rostrum reaching the intermediate coxæ, its apex black.

Long., excl. tegm., ♂ 21, ♀ 22 mm.; exp. tegm., ♂ 55, ♀ 67 mm.

*Hab.* Brazil; Espirito Santo (Brit. Mus.).

### Imbabura, gen. nov.

♀. Head broader between the eyes than long, front subangulate, lateral margins of the vertex distinctly lobately semi-erect above the insertion of the antennæ, eyes large, longer than broad, projecting moderately beyond the anterior pronotal angles; pronotum subquadrate, subconvex, about as long as mesonotum including the basal cruciform elevation, which is transverse, a little broader than long; abdomen about as long as space between apex of head and base of cruciform elevation; rostrum about or almost reaching the posterior coxæ; anterior femora thickened, with about three long spines beneath, tibiæ spinulose; tympana completely exposed; tegmina elongate, about three times as long as greatest breadth, eight apical areas, the upper two short, the lowermost shortest, costal membrane and postcostal area narrow; wings short and narrow, about half the length of the tegmina, apical areas four.

Allied to *Nelcyndana* by the venation of the wings, which have only four apical areas.

*Imbabura typica*, sp. n.

♀. Body and legs ochraceous; pronotum slightly darker, with the fissures narrow but distinct; abdomen above darker on apical area (*query*: *stain?*); face and clypeus distinctly centrally longitudinally ridged; apex of rostrum black; tarsi more or less castaneous; tegmina and wings hyaline, the first very lightly and obscurely tinged with pale bronzy on anterior half, basal veins, costal membrane, and post-costal area ochraceous, remaining venation piceous, a short basal piceous streak at lower base of tegmina.

Long., excl. tegm., ♀ 9½ mm.; exp. tegm. 30 mm.

*Hab.* N.W. Ecuador; Rio Durango, 350 feet (Brit. Mus.).

Durangona, gen. nov.

Head about as long as breadth between eyes, which are large, prominent, and distinctly produced beyond the anterior angles of the pronotum, front somewhat triangularly produced, almost as long as broad at base, its lateral margins and those of vertex discontinuous, vertex a little longer than front, ocelli between eyes, the two posterior at basal margin of head; pronotum scarcely longer than head, its lateral margins somewhat straight but narrowed at anterior angles, its posterior angles distinctly laterally produced; mesonotum (including cruciform elevation) a little longer than pronotum; abdomen somewhat strongly dilated in male, centrally arched and carinate above, distinctly longer than space between apex of head and base of cruciform elevation; tympana entirely exposed; opercula in male short, not quite covering the cavity, their apical margins rounded, their inner angles widely separated; rostrum about reaching the intermediate coxæ; anterior femora with three long spines beneath; tegmina and wings hyaline, tegmina with eight, wings with five apical areas; basal cell to tegmina not twice as long as broad.

Allied to *Conibosa*, Dist., from which it principally differs by the large and prominent eyes, the different position of the ocelli, shorter head, &c.

*Durangona tigrina*, sp. n.

Head pale ochraceous, margins of front darker excepting a pale apical spot, margins of the ocelli pale castaneous brown; pro- and mesonota brownish ochraceous, both with a pale central longitudinal fascia, the cruciform elevation pale,

with a central dark median line ; abdomen above greyish, the posterior segmental margins ochraceous, each segment with a broad transverse fuscous fascia, narrowed and terminating in a prominent spot near lateral margin ; body beneath and legs more or less ochraceous ; abdomen beneath darker, the posterior segmental margins ochraceous and with a lateral segmental series of fuscous spots ; transverse carinations to face dark castaneous ; tegmina and wings hyaline, the venation castaneous or fuscous ; tegmina with the costal membrane greyish, with a distinct fuscous spot at its apex and a larger spot at the apex of the upper apical area.

♂. Long., excl. tegm., 16 mm. ; exp. tegm. 40 mm.

*Hab.* N.W. Ecuador ; Rio Durango, 350 feet (Brit. Mus.).

## Genus Urabunana.

*Urabunana*, Dist. Ann. & Mag. Nat. Hist. (7) xvi. p. 274 (1905).

Type, *U. sericeivitta*, Walk.

### *Urabunana marshalli*, sp. n.

♂. Head, pronotum, and mesonotum black ; three small marginal spots to front of head, lateral margins of pronotum, two percurrent discal longitudinal fasciæ and narrow lateral margins to mesonotum, and exposed areas of metanotum pale ochraceous ; abdomen above ochraceous, with nearly basal half and a central longitudinal fascia black ; body beneath and legs pale ochraceous ; face (excluding margins), metasternum, a central spot at base of abdomen, apex of rostrum, and bases and apices of tarsi black ; space between face and eyes black, thickly ochraceously pilose ; tegmina and wings hyaline, the first with the basal half of venation and the costal membrane ochraceous, costal margin and apical half of venation and posterior claval margin black ; wings with the venation ochraceous, piceous on apical area ; tympana above entirely exposed ; abdomen above with a central longitudinal notched dorsal ridge ; opercula transverse, somewhat widely separated, interiorly and outwardly rounded ; wings with four apical areas.

Long., excl. tegm., ♂ 10½ mm. ; exp. tegm. 26 mm.

*Hab.* N. S. Wales ; Gooniwindi (*T. Marshall*, Brit. Mus.).

Allied to *U. festiva*, Dist.

XVI.—*Descriptions of some new Species of Heterocera, chiefly from Tropical South America.* By Herbert Druce, F.L.S. &c.

Fam. **Syntomidæ.**

*Mesothen doris*, sp. n.

*Male*.—Head, collar, tegulæ, thorax, abdomen, and legs pale yellow; antennæ black; palpi pale yellow, with black tips; abdomen with a central row of black spots. Primaries hyaline, the costal margin pale yellow, the veins at the base yellow beyond and the margins of the wing black: secondaries hyaline, the veins and margins black, the fringe black.

Expanse 1½ inch.

*Hab.* Colombia, Monte del Edna, 5000 feet (*Mus. Druce*).

Subfam. *Arctinæ*.

*Metarctia palæmon*, sp. n.

*Male*.—Head, collar, tegulæ, thorax, and abdomen chrome-yellow; antennæ and anus blackish brown; legs chrome-yellow. Primaries hyaline, the basal half of the wing chrome-yellow, the veins, the costal margin at the apex, and the fringe black: secondaries chrome-yellow, bordered with black at the apex and partly round the outer margin. Underside very similar to the upperside.

Expanse 1 inch.

*Hab.* West Africa, Bitji, Ja River, Cameroons, 2000 feet (*Mus. Druce*).

*Automolis pinon*, sp. n.

*Female*.—Head, antennæ, collar, tegulæ, and thorax yellowish grey; abdomen pinkish yellow; the underside and legs pale yellow. Primaries bright pink; a large round yellow spot at the end of the cell and an oval-shaped yellow spot on the inner margin near the base; the outer margin from the apex nearly to the anal angle broadly bright yellow: secondaries pale yellow. Underside as above, but rather deeper in colour.

Expanse 1½ inch.

*Hab.* South Brazil, Alto da Serra Santos, 2600 feet (*Mus. Druce*).

Allied to *Automolis roseofasciata*, Druce.

*Opharus superba*, sp. n.

*Male.*—Head, antennæ, palpi, and legs black; collar black, edged with orange; tegulæ grey, edged with black; thorax black, clothed with orange-red hairs; abdomen chrome-yellow, the three middle segments black above, the underside of the anus black. Primaries fawn-colour, the veins black; five bands of broken orange irregular spots edged with black cross the wing from the costal to the inner margin, the inner margin black at the base to about the middle; a black spot at the anal angle; the fringe black and yellow: secondaries chrome-yellow, broadly bordered with black from the apex to the anal angle; a rather large crescent-shaped black spot at the end of the cell. Underside very similar to the upperside.

Expanse $3\frac{1}{4}$ inches.

*Hab.* South Brazil, Alto da Serra Santos, 2600 feet (*Mus. Druce*).

A very distinct species allied to *Opharus chorima*, Schaus.

*Virbia palmeri*, sp. n.

*Male.*—Head, collar, tegulæ, thorax, and upperside of the abdomen very dark brown, the sides of the abdomen yellow; legs dark brown; antennæ black. Primaries dark brown, irrorated with yellowish scales: secondaries chrome-yellow, broadly bordered with black from the apex to the anal angle, where it is widest, and deeply dentated on the inner edge. Underside: primaries as above, secondaries rather paler.—*Female* the same as the male.

Expanse $1\frac{1}{2}$ inch.

*Hab.* W. Colombia, San Antonio, 5800 feet (*Mus. Druce*).

*Virbia punctata*, sp. n.

*Male.*—Head, collar, tegulæ, thorax, and legs dark brown; abdomen black, the sides yellow. Primaries dark brown; a yellow spot at the end of the cell; the fringe yellowish brown: secondaries chrome-yellow, bordered with black, widest at the anal angle. Underside of the primaries yellow, bordered with dark brown; secondaries very similar to the upperside.

Expanse $1\frac{1}{2}$ inch.

*Hab.* Colombia, Siato, Rio Siato; slopes of Choco, 5200 feet (*Mus. Druce*).

*Virbia epione*, sp. n.

*Male*.—Head, collar, tegulæ, and thorax pale brown; antennæ, abdomen, and legs black, sides of the abdomen yellow. Primaries pale brown: secondaries black, yellow on the inner margin; a rather wide yellow streak forked at the end extends from the base to just beyond the cell; the fringe yellow.

Expanse $1\frac{1}{2}$ inch.

*Hab*. S.E. Peru, Santo Domingo, 6000 feet (*Mus. Druce*).

*Virbia birchi*, sp. n.

*Male*.—Head, antennæ, collar, tegulæ, thorax, abdomen, and legs black; the sides of abdomen yellow. Primaries black: secondaries black, with a central yellow streak from the base to beyond the cell; the fringe of both wings black. The underside of the primaries yellow, bordered with black.

Expanse $1\frac{3}{4}$ inch.

*Hab*. Caparo, W. Central Trinidad; Colombia, Cacagualito, 1500 feet (*Mus. Druce*).

*Virbia underwoodi*, sp. n.

*Male*.—Head, antennæ, collar, tegulæ, thorax, abdomen, and legs black. Primaries black, darkest at the base: secondaries pale yellow, narrowly edged with black from the apex to vein 3, then widely banded with black to the inner margin. The underside of the primaries with a large round yellow spot at the end of the cell; secondaries as above.

Expanse 2 inches.

*Hab*. Costa Rica, Carrillo (*Mus. Druce*).

Fam. **Notodontidæ**.

*Farigia nana*, sp. n.

*Male*.—Head, collar, tegulæ, thorax, and upperside of the abdomen grey, thickly irrorated with black hairs; antennæ brown, the shaft white; underside of the abdomen and legs yellowish white. Primaries pale brown, thickly irrorated with green and grey scales, grey on the costal margin near the base; an indistinct greenish-brown waved band extends from the costal margin near the apex to the inner margin nearest the anal angle; a marginal waved black line from the apex to the anal angle; the fringe pale fawn-colour: secondaries pale brown, yellowish at the base and along the

inner margin. Underside : primaries very pale brown, dark brown on the costal margin ; secondaries uniformly yellowish white.

Expanse 1¾ inch.

*Hab.* S.E. Peru, Santo Domingo, 6000 feet (*Mus. Druce*).

Allied to *Farigia tulana*, Schaus.

*Farigia baladan*, sp. n.

*Female.*—Head, collar, tegulæ, and thorax grey ; abdomen pale brown, irrorated with grey hairs. Primaries grey, thickly irrorated with bright green scales, crossed from the costal to the inner margin by three fine waved black lines ; the wing partly shaded with very pale brown beyond the cell ; a round black spot between veins 2 and 3 ; the fringe blackish grey : secondaries dark brown, slightly yellowish at the base. Underside : both wings uniformly dark brown.

Expanse 2½ inches.

*Hab.* S.E. Peru, Santo Domingo, 6000 feet ; Quinton, Carabaya, 5000 feet (*Mus. Druce*).

*Farigia medan*, sp. n.

*Male.*—Head, collar, tegulæ, and thorax greenish grey ; abdomen and antennæ greyish brown ; underside of the abdomen and legs pale brown. Primaries brown, thickly irrorated with green scales about the middle ; the base of the wing broadly grey ; the fringe dark brown : secondaries dark brown. Underside of both wings pale whitish brown.

Expanse 1½ inch.

*Hab.* Colombia, El Tigre, Rio Tamaua ; Choco, 350 feet (*Mus. Druce*).

A small species allied to *Farigia nana*, Druce.

*Farigia larissa*, sp. n.

*Female.*—Head, collar, and tegulæ white ; thorax and abdomen brown, the anal segments greyish ; legs pale brown. Primaries dark brown, the outer third of the wing white ; a large greyish spot at the end of the cell, edged with white ; a round reddish-brown spot between veins 2 and 3 and one between 3 and 4 ; a submarginal black line extends from the apex to the anal angle ; the fringe brownish grey : secondaries brown, the veins dark brown. Underside of both wings dark brown.

Expanse 2¼ inches.

*Hab.* Colombia, Juntas, Rio Tamaua, Rio San Juan ; Choco, 400 feet (*Mus. Druce*).

*Farigia xenopithia*, sp. n.

*Male*.—Head, collar, tegulæ, underside of thorax, and legs pale fawn-colour mixed with greenish hairs; upperside of the abdomen dark brown, underside yellow. Primaries dark blackish brown, thickly irrorated with greenish scales; a series of small black spots along the inner margin; four small green spots edged with black on the costal margin; a waved black line extends from the apex to the anal angle; three elongated brown spots at the apex: secondaries dark reddish brown. Underside of all the wings uniformly pale pinkish brown.

Expanse $1\frac{3}{4}$ inch.

*Hab.* Trinidad, Caparo (*Mus. Druce*).

*Hippia cinga*, sp. n.

*Male*.—Head and collar grey-brown; antennæ, palpi, tegulæ, and thorax dark brown; abdomen above dark blackish brown, underside pale brown; legs brown, banded with white. Primaries dark blackish brown, irrorated with a few black scales; a pale long greyish patch at the apex, extending along the costal margin to the middle; a marginal row of pale brown spots from the apex to the anal angle; the fringe dark brown: secondaries dark brown, the fringe pale fawn-colour. Underside: both wings pale brown; secondaries yellowish at the base.

Expanse 2 inches.

*Hab.* Chanchamayo, 1000–1500 metres (*Mus. Druce*).

Allied to *Hippia astuta*, Schaus.

*Drugera mimica*, sp. n.

*Male*.—Head, antennæ, collar, tegulæ, thorax, and upperside of the abdomen dark greyish brown; underside of the abdomen and legs yellowish brown. Primaries pale grey-brown, dark brown on the costal margin near the base, the basal part of the wing streaked with black; a band of lunular-shaped white spots edged with black crossing from the costal to the inner margin beyond the cell; a marginal row of black dots extends from the apex to the anal angle; the marginal line black; the fringe pale greyish brown: secondaries dark reddish brown; the fringe pale fawn-colour. Underside of both wings pale brown, the costal margin of the secondaries yellowish.

Expanse 2 inches.

*Hab.* Colombia, Juntas, Rio Tamaua, Rio San Juan ; Choco, 400 feet (*Mus. Druce*).

Allied to *Drugera morona*, Druce.

*Dicentria klagesi*, sp. n.

*Male.*—Head, antennæ, palpi, collar, tegulæ, and thorax dark brown ; abdomen black, the two anal segments pale fawn-colour; underside of the abdomen brownish white; legs pale brown. Primaries pale fawn-colour, irrorated with brown scales ; the base of the wing greyish black ; a large black spot at the end of the cell ; the fringe fawn-colour : secondaries white, the costal margin and apex grey, the inner margin greyish, with a black spot on the anal angle. Underside of both wings greyish white, the costal margin shaded with brown.

Expanse $1\frac{3}{4}$ inch.

*Hab.* Trinidad, Caparo (*S. M. Klages, Mus. Druce*).

*Heterocampa tricolor*, sp. n.

*Male.*—Head, antennæ, palpi, collar, tegulæ, thorax, abdomen, and legs greenish brown. Primaries cream-colour, the basal third of the wing greenish brown : secondaries white, irrorated with green scales on the costal margin ; the fringe white. Underside of both wings white, the costal margin of the primaries edged with yellow.

Expanse $1\frac{3}{4}$ inch.

*Hab.* W. Colombia, San Antonio, 5800 feet (*Mus. Druce*).

*Heterocampa gilboa*, sp. n.

*Male.*—Head, antennæ, collar, tegulæ, thorax, and legs greenish brown ; abdomen above blackish brown, the anal segments greenish brown; the underside of the abdomen sordid white. Primaries white, the base greenish brown, thickly irrorated with white scales; a greenish-brown band crosses the wing beyond the middle, widest on the costal margin, becoming quite narrow at the anal angle ; the apex and outer margin shaded with green : secondaries white, the costal margin and fringe greenish. Underside of both wings white ; a dark brown mark on the costal margin of the primaries beyond the cell.

Expanse $1\frac{3}{4}$ inch.

*Hab.* S.E. Peru, Santo Domingo, 6000 feet (*Mus. Druce*).

*Heterocampa splendens*, sp. n.

*Male*.—Head, palpi, tegulæ, and thorax pinkish grey; collar yellowish; antennæ brown; abdomen above pale brown, the sides yellow, underside sordid white, the anal segments clothed with grey hairs; underside of the thorax and legs grey. Primaries pale fawn-colour, pinkish grey at the base, crossed from the costal to the inner margin by a series of waved black lines, the first four near the base, the second three beyond the cell; a series of black spots between the veins extend from the apex to the anal angle; a waved black marginal line: secondaries chrome-yellow, broadly bordered with blackish grey from the apex to the anal angle. Underside of both wings white, pale yellow at the base: primaries with a dark brown wide line crossing the wing beyond the cell from the costal margin to vein 2.

Expanse $2\frac{3}{4}$ inches.

*Hab.* S. Brazil, Rio (*Mus. Druce*).

*Heterocampa semialba*, sp. n.

*Male*.—Head, palpi, and collar grey, tegulæ white; antennæ greyish brown; thorax and abdomen dark grey, the sides of the abdomen and the anus white; legs and underside of the thorax white. Primaries dark grey, the base white irrorated with grey scales; a waved black line crosses the wing beyond the cell from the costal to the inner margin, beyond which is a large broad white patch that does not extend to the apex or anal angle; a marginal black waved line extends from the apex to the anal angle; the white mark is slightly clouded in the middle by a few grey scales; fringe black and white: secondaries white, greyish at the anal angle. Underside of both wings white; primaries clouded with grey along the costal margin.

Expanse 2 inches.

*Hab.* E. Peru, Chanchamayo, 2000 met. (*Mus. Druce*).

*Psilagon cincia*, sp. n.

*Male*.—Head, collar, tegulæ, upperside of abdomen, and legs dark brown; thorax and antennæ pale brown, the anus yellowish green. Primaries greyish white, irrorated with grey and greenish-yellow scales; the base greenish yellow, crossed by three curved dark brown lines; the inner margin thickly clothed with greenish-yellow scales: secondaries white, a greenish-yellow spot at the apex and a few black

hairs on the inner margin. Underside: both wings sordid white.

Expanse 2 inches.

*Hab.* S.E. Peru, Santo Domingo, 6000 feet (*Mus. Druce*).

*Psilagon melita*, sp. n.

*Male.*—Head, palpi, collar, tegulæ, thorax, abdomen, and legs yellowish green; underside of the abdomen white; antennæ brown. Primaries greenish grey; a reddish-brown band extends from the middle of the inner margin up to the median vein, where it divides and forms a Y-shaped mark extending to the costal margin; a submarginal row of white spots with black points from the apex to the anal angle; the fringes reddish brown: secondaries white, the fringe white. Underside of both wings white; the costal margin of the primaries yellowish.

Expanse 1½ inch.

*Hab.* S.E. Peru, Santo Domingo, 6000 feet (*Mus. Druce*).

*Urgerda chaon*, sp. n.

*Male.*—Head, palpi, collar, tegulæ, and thorax pale brownish green, thickly irrorated with yellowish hairs; antennæ pale brown; abdomen reddish brown; anus greenish. Primaries pale brown, thickly irrorated with black and green scales; two small white spots at the end of the cell and a submarginal row of whitish dots extending from the apex to the anal angle; the marginal line black: secondaries reddish brown, palest at the base. Underside of primaries reddish brown, of the secondaries cream-colour.

Expanse 1¾ inch.

*Hab.* W. Colombia, San Antonio, 5800 feet; S.E. Peru, Santo Domingo, 6000 feet (*Mus. Druce*).

*Urgerda luceria*, sp. n.

*Male.*—Green; antennæ brown; collar grey, edged with black and white; tegulæ and thorax green; abdomen and legs pale brown. Primaries grey, irrorated with black scales; the subcostal vein green; a green band crossing the wing near the base, a second green band, edged with black on the inner side, beyond the cell, crossing the wing from the costal to the inner margin; a submarginal row of black points extending from the apex to the anal angle; the fringe dark grey: secondaries greyish brown. Underside of both

wings reddish brown, the costal margin of the secondaries whitish.

Expanse 1¾ inch.

*Hab.* Peru, Quinton, Carabaya, 5000 feet (*Mus. Druce*).

*Urgerda brunea*, sp. n.

*Male.*—Head, palpi, antennæ, collar, tegulæ, thorax, abdomen, and legs dark brown; the underside of the abdomen and anus pale brown. Primaries dark reddish brown, irrorated with pale greyish-brown scales; a whitish streak at the end of the cell; a submarginal row of rather large dark brown spots between the veins, extending from the apex to the anal angle; the fringe dark brown: secondaries blackish brown; the underside of both wings pale brown.

Expanse 1¾ inch.

*Hab.* Peru, Oconeque, Carabaya, 7000 feet (*Mus. Druce*).

*Urgerda palmeri*, sp. n.

*Male.*—Head, collar, tegulæ, and thorax yellowish brown; palpi and antennæ black; abdomen above black, the anus yellow; underside of abdomen pale brown; legs dark brown. Primaries reddish brown, clouded with yellow at the apex, and on the inner margin three indistinct waved brown lines cross the wing from the costal to the inner margin; the outer margin from the apex to the anal angle broadly yellow, much dentated on the inner side; a fine waved white line divides the yellow and brown colour of the wing; the fringe yellow: secondaries pale yellowish grey, clouded with brown on the costal margin, apex, and outer margin; a reddish-brown spot on the anal angle; the fringe yellow. Underside: both wings yellowish white; primaries clouded with dusky brown from the base to beyond the cell; the costal margin near the apex pink: secondaries with a black spot at the anal angle.

Expanse 1¾ inch.

*Hab.* W. Colombia, San Antonio, 5800 feet (*Mus. Druce*).

*Malacampa bœttgeri*, sp. n.

*Male.*—Head, palpi, collar, tegulæ, and thorax very dark brown, almost black, thorax irrorated with a few green hairs; abdomen above very dark brown; underside and legs pale brown, the anus clothed with green hairs. Primaries black-brown, crossed beyond the cell by two waved black lines; a

green spot at the end of the cell ; the outer and inner margins very thickly irrorated with green scales ; the marginal line black: secondaries dark brown ; the fringe pale brown. Underside of both wings dark brown.

Expanse 2¼ inches.

*Hab.* East Peru, Huaucabamba, 6000–10,000 feet (*Mus. Druce*).

*Meragisa julia*, sp. n.

*Male.*—Head, collar, tegulæ, and thorax brownish grey ; antennæ and palpi dark brown ; abdomen black, clothed with long yellowish hairs at the base ; the anal segments dark grey ; the underside of the thorax, abdomen, and legs yellow. Primaries dark grey, crossed by indistinct waved black lines and irrorated with black scales ; a round black spot between veins 3 and 4 ; the marginal line black ; the fringe yellow : secondaries black ; the inner margin broadly yellow ; the fringe yellow. Underside : both wings black ; the costal and outer margin of both wings yellow ; the base and inner margin of the secondaries yellow.

Expanse 2½ inches.

*Hab.* S.E. Peru, Santo Domingo, Carabaya, 6000 feet ; Oconeque, 7000–10,000 feet (*Mus. Druce*).

Allied to *Meragisa garlepi*, Druce.

*Meragisa thryeston*, sp. n.

*Male.*—Head, tegulæ, thorax, and abdomen grey ; abdomen clothed with yellowish hairs at the base ; collar black ; underside of the thorax, abdomen, and legs yellowish grey. Primaries silvery white, slightly irrorated with black scales ; a pale yellow spot edged with black close to the base and two waved yellowish lines edged with black crossing the wing from the costal to the inner margin, the first near the base, the second beyond the cell ; a marginal waved black line extends from the apex to the anal angle ; the fringe white : secondaries black, the inner margin yellow ; the fringe yellowish. Underside : primaries black, the costal, apex, and outer margin white : secondaries black ; the base, costal, outer and inner margin yellowish white.

Expanse 2 inches.

*Hab.* S.E. Peru, La Oroya, Rio Inambari, 3000 feet (*Mus. Druce*).

Allied to *Meragisa sidota*, Schs.

*Rifargia imitata*, sp. n.

*Male*.—Head, palpi, collar, and tegulæ dark brown; antennæ pale brown; thorax and abdomen greenish grey; legs dark brown. Primaries greenish grey, the base broadly dark brown, edged with black on the outer side; a greenish-grey spot at the base of the cell; a small brown spot close to the apex; a brown spot between veins 1 and 2, and a rather large square-shaped dark brown spot between veins 3 and 4; a submarginal line of black streaks extends from the apex to the anal angle: secondaries greyish brown, darkest round the outer margin; a small black spot on the anal angle.

Expanse 2¼ inches.

*Hab.* Trinidad, Caparo (*Mus. Druce*).

This species resembles very closely *Proelymiotis æquipars*, Walker.

Fam. **Noctuidæ**.

*Acontia? superba*, sp. n.

*Male*.—Head, palpi, antennæ, collar, tegulæ, thorax, abdomen, and legs dark brown. Primaries dark silky brown; the fringe dark brown: secondaries bright, glossy, dark purple; the fringe black. Underside of both wings pale brown.

Expanse 1½ inch.

*Hab.* W. Africa, Upper Kasai District, Congo Free State (*Mus. Druce*).

*Acontia? roseipicta*, sp. n.

*Male*.—Head, palpi, collar, tegulæ, thorax, and abdomen pale brown; antennæ black. Primaries pinkish fawn-colour, irrorated with black scales; a large rose-coloured spot on the middle of the inner margin, white on the inner side, edged with a black line; several small white dots at the anal angle; the fringe pinkish fawn-colour: secondaries pale brown, palest at the base. Underside pale brown, slightly irrorated with black scales.

Expanse 1¼ inch.

*Hab.* W. Africa, Bitji, Ja River, Cameroons, 2000 feet, dry season (*Mus. Druce*).

Subfamily *Euteclinæ*.

*Pœctes chrysoplaga*, sp. n.

*Male*.—Head white; palpi black, the third joint white; antennæ, collar, tegulæ, thorax, and abdomen pale brown; the middle segments of the abdomen white above; the underside of the thorax and legs white. Primaries pale brown, shaded with pink at the base and apex; a curved band crosses the wing from near the apex to the middle of the inner margin; a large greenish spot on the inner margin nearest the base, and a smaller spot at the anal angle; a large dark brown curved mark on the outer margin; several minute black dots at the end of the cell and on the apex: secondaries dark brown. Underside: primaries greyish black, reddish brown at the apex: secondaries greyish white; a minute black dot at the end of the cell, below which are several very fine, waved, blackish lines, extending from near the apex to the anal angle, the outer margin broadly reddish brown.

Expanse $1\frac{3}{10}$ inch.

*Hab.* S.E. Peru, Santo Domingo, 6000 feet (*G. Ockenden, Mus. Druce*).

Allied to *Pœctes oculatrix*, Guen., from North Carolina.

*Marthyssa dissimilis*, sp. n.

*Male*.—Head, palpi, antennæ, collar, tegulæ, thorax, abdomen, and legs dark brown. Primaries pale brown, with two triangular-shaped dark brown spots (one on the costal margin small, the second on the inner margin near the base much larger), beyond which are two dark brown lines crossing the wing from the costal to the inner margin; a dark curved line close to the apex and two black dots on the anal angle; the fringe dark brown: secondaries dark brown, palest at the base and along the inner margin almost to anal angle. Underside: primaries pale greyish brown, reddish brown at the apex; a submarginal curved white line extends from the costal margin to the apex; the fringe greyish: secondaries, the costal half of the wing reddish brown, the inner half greyish brown.

Expanse $1\frac{1}{4}$ inch.

*Hab.* Colombia, Minca, 2000 feet (*H. H. Smith, Mus. Druce*).

*Tyana tenuimargo*, sp. n.

*Male.*—Head, collar, tegulæ, and base of primaries white edged with red; palpi white tipped with red; antennæ brown, the base red, the edges of the tegulæ red; thorax green; abdomen and legs brownish white. Primaries pale green, the costal and outer margin edged with yellowish red, the marginal line spotted with white; a small red spot below the end of the cell: secondaries sordid white, very pale brown near the anal angle. Underside of both wings white, shaded with pale green at the base.—*Female* similar to the male, but with a reddish-brown spot on the costal margin nearest the base, and the spot below the cell much larger, the outer margin redder, the ground-colour of the wing striated with fine yellow lines; the secondaries pure white. Underside white, the primaries shaded with green.

Expanse, ♂ 1½ inch, ♀ 1$\frac{1}{10}$ inch.

*Hab.* Assam, Khasia Hills, Nissary (*Mus. Druce*).

*Carea pryeri*, sp. n.

*Male.*—Head, palpi, antennæ, collar, tegulæ, thorax, and abdomen reddish brown, the base of the abdomen blackish brown, the anus reddish. Primaries glossy reddish brown, slightly greyish brown on the outer margin; a black spot at the end of the cell; two dark brown lines cross the wing from the costal to the inner margin, the first nearest the base, the second beyond the cell to the anal angle: secondaries uniformly dark brown; the underside of both wings reddish brown; primaries with a dark shade at the end of the cell.

Expanse 1¾ inch.

*Hab.* North Borneo (*Pryer*, *Mus. Druce*).

*Carea viridipennis*, sp. n.

*Male.*—Head, collar, tegulæ, and thorax olive-green; palpi and antennæ reddish brown; abdomen and legs pale brown. Primaries olive-green, crossed from the costal to the inner margin by three waved fine black lines, the first near the base, the second beyond the cell, the third submarginal, the middle line edged with greenish white on the outer side; the fringe green: secondaries and underside of both wings reddish brown.

Expanse 1½ inch.

*Hab.* Borneo, Labuan (*Pryer, Mus. Druce*).

## XVII.—*Notes on the Coleopterous Subfamily* Dynastinæ, *with Descriptions of new Genera and Species.* By Gilbert J. Arrow.

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[Plates IV. & V.]

While compiling a Catalogue of the Dynastinæ, to be published shortly, I have had occasion to make various synonymical and other notes, and these are here recorded, together with descriptions of a few of the new species contained in the collection of the British Museum.

In Gemminger and Harold's Catalogue the name *hewitsoni*, Empson, is given as a synonym of *Golofa porteri*, Hope, with a reference to Maunder's 'Treasury of Natural History' (1858). In that work it is said that the insect has received the name *Asserador hewitsoni* in Empson's 'Narrative of S. America.' This work, having been published in 1836, would, if the statement were correct, antedate both the generic and specific names given by Hope in 1837. I have therefore with considerable care searched Empson's 'Narrative' page by page in the British Museum library, and have satisfied myself that the name quoted does not occur there. Thomson, in his 'Arcana Naturæ,' has stated that the name *Asserador hewitsoni* appears upon an isolated plate, without description. A note in the 'Narrative' mentions that a portfolio of facsimile sketches was purchasable, but these I have not been able to discover; and as it seems certain that no description of *hewitsoni* appeared before the publication of Maunder's 'Treasury,' Hope's names, so long current, may, I think, remain undisturbed. A specimen bearing Empson's proposed name, and apparently his original, is still in our collection.

It is, perhaps, scarcely necessary to say that the various "new species" of *Dynastes* from Dominica named by Mr. A. H. Verrill in his curiously inaccurate papers in the 'American Journal of Science' of 1906 and 1907 indicate nothing more than different phases of male development of the very well-known and variable *Dynastes hercules*, L. His *Dynastes tricornis*, as the writer has already discovered, is a *Strategus*. The name *tricornis* has been long preoccupied, but the "new species" is probably *S. vulcanus*, F. The long-familiar species *Strategus tricornis*, Jabl., should, however, be called *S. validus*, F., a name which has been overlooked. The type of Fabricius (described in his Syst. Ent. 1775, p. 6) is a female in the British Museum.

*Stypotrupes endymion*, Oliv., of which the original examples are in the British Museum, is a *Strategus* with the head of the male peculiarly modified, the end of the clypeus being produced upwards as a broad lamina. Burmeister, the author of the genus, was entirely mistaken as to its affinities, and the genus is an especially unsatisfactory one, being based upon the present species, the totally different one for which I have already made the genus *Clyster*, and a third, of which only a fragment is known, and which, if, as supposed, it is Oriental, is certainly also very different. A female of *S. endymion* in the Museum was apparently brought by Darwin from the Galapagos Islands, and there can at least be no doubt that the insect belongs to the American fauna. The female shows so intimate a relationship to *Strategus* that I think the advisability of treating the species as a member of that genus will hardly be disputed. A difference is generally found in the sculpture of the propygidium in the two sexes of *Strategus*, and this is accentuated in *S. endymion*, the male of which has rather fine stridulatory ridges, which in the female are represented by very coarse scattered granules.

By a process of elimination the unknown *S. telamon*, Burm., is now left alone to represent the genus *Stypotrupes*. Its identity can only be established by examination of the fragmentary type in M. Oberthür's collection.

*Enema pan*, F., is a remarkable polymorphic species, concerning which perplexity still prevails. Bates, in the 'Biol. Centr.-Americana,' has figured the female form (called *titornus* by Perty) as a male, calling it the variety *lupercus*, Chevr., which is really the reduced male phase. In the same work he expressed a strong suspicion that *Enema infundibulum*, Burm., is a form of this species, but without actually putting them together. Herr Sternberg has described them as two forms of a vanished species, which seems to be a way of saying two species of the closest affinity. It appears to me that the evidence is entirely in favour of regarding them as actually conspecific, *infundibulum* being the extreme phase of development of the male armature. The two forms occur in the same localities from Central America to South Brazil, but, abundant as they are, only a single form of female is found. I have examined the male genitalia, and found no difference.

It is very remarkable that, whereas in the typical form every grade of armature is found, from the highest to a degraded form little distinguished from the female, no intermediates connecting it with the differently armed *infundibulum*

form are known; but the difficulty is not less if the latter is treated as a distinct species, for I know of no instance of a species with very highly developed male armature of which amongst numerous examples none of low development are found.

In Redtenbacher's description of the isolated and interesting insect named by him *Myrina pfeifferi* the length is given as 47 lines, apparently a misprint for 17 lines. The series in the British Museum vary from 28 to 35 mm. long.

It is worthy of notice that in this peculiar insect the front claws of the male assume a form which, so far as I know, is unique. They are very strong and broad and double at the tip, but instead of one claw only being cleft into two sharp points, as is not unusual in certain groups of Dynastinæ, the true tip of each claw forms a slight finger-like process, while the lower division is a rounded lobe or flange. The entire inner surface of the claws, as in many other species, is covered with fine oblique striations.

This interesting Oriental insect has a striking resemblance to the Tropical American *Megasoma*. A marked difference between them is in the development of the prosternum of *Myrina*. The latter name being a doubly preoccupied one, I propose to substitute for it

ALLOMYRINA, nom. nov.

The insect called by Fairmaire *Oryctes melanops* in the Ann. Soc. Ent. France, 1881, p. 258, is entirely different from the real *Oryctes melanops* of Burmeister, which, as Herr Prell has suggested to me after comparison of a long series of specimens, is probably only a variety of *Haploscapanes barbarossa*, F. Fairmaire's insect is a *Trichogomphus* very closely related to *T. semmelinki*, Rits., and for the sake of clearness it seems desirable to name it. It may be called

*Trichogomphus fairmairei*, sp. n.

It is rather shorter and stouter than *T. semmelinki*, with the prothorax more transverse, but the puncturation is almost exactly the same. The only male specimen in the British Museum, like that described by Fairmaire, seems to be of low development, although this is possibly characteristic. The cephalic horn is short and simply acuminate, and the pronotum bears only a slight double median prominence and an acute lateral tubercle on each side of the

broad excavation. The female has two very inconspicuous tubercles behind the middle of the front margin of the prothorax. The species has already been described at greater length by Fairmaire.

The identity of *Oryctes ingens*, Kolbe, and *Dimyxus crampeli*, Fairm., with *Oryctes cristatus*, Voll., has been pointed out by Messrs. Sternberg and Felsche. It has not been noticed, however, that a still older name exists, viz. *Oryctes gigas*, Cast.

Herr Sternberg has rightly distinguished *Xyloryctes telephus*, Burm., and *ensifer*, Bates (which he has renamed *X. lævipennis*), which were not properly discriminated by Bates, who attributed both to the same localities. The examples of *X. telephus* in our collection are from Jalapa and Oaxaca, while *X. ensifer* has been brought from Jalapa, Cordova, Chiapas, Omilteme, S. Luis Potosi, and also from Chuipache, Quezaltenango (Guatemala).

In the 'Fauna of India, Lamellicornia,' lately published, I have referred to *Dipelicus* the species described as *Horonotus* and *Camelonotus*. *H. deiphobus*, Sharp, forms a connecting-link between the larger well-punctured species represented by *D. cantori*, Hope, and the smaller smooth forms of the *montrouzieri* group. The actual habitat of *D. deiphobus* was unknown to Sharp, but specimens from the Philippine Islands were determined by Waterhouse by comparison with a typical example from Dejean's collection, and I have lately received it from Sarawak, Borneo.

*D. cantori* was described from a female supposed to have come from China, but the type in the British Museum appears to agree sufficiently with that of the Javan species described and figured under that name by Waterhouse. The following is closely related:—

*Dipelicus borneensis*, sp. n. (Pl. IV. figs. 1, 2, 3.)

Niger vel nigro-piceus, corpore subtus rufescente, pectore haud longe rufo-hirto, elongatus, robustus, valde convexus; clypeo rotunde acuminato; prothorace transverso, postice leviter lobato; scutello rugoso, margine angusto, lævi; elytris grosse et crebre annulato-punctatis, lineis tribus discoidalibus geminatis; propygidio retrorsum producto, late subtiliter striato; pygidio brevi:

♂, capite cornu erecto curvato, basi lato, apice acuto, armato; pronoto late excavato, fossæ lateribus fere rectis, antice breviter productis, margine postico bispinoso, spinis sat approximatis, lobo

postico modice prominenti, integro, pronoto postice et lateraliter omnino rugoso; propygidio valde retrorsum producto; pygidio minute et crebre granulato:

♀, prothorace valde convexo, grosse rugoso, margine antico medio minute retrorsum dentato; propygidio modice producto, pygidii lateribus subtiliter rugosis, medio nitido, parce punctato.

Long. 37–41 mm.; lat. max. 19–21 mm.

*Hab.* Borneo: Sarawak, Kina Balu.

*D. borneensis* is very closely related to *D. cantori*, Hope, but is rather more strongly and coarsely sculptured above, and has the thoracic cavity of the male a little less deep, its side walls nearly straight, the anterior processes short, the two dorsal processes placed rather close together, the dorsal lobe short, not notched in the middle, and without a smooth depression on each side. The females of the two species are exceedingly similar, but that of *D. borneensis* has the pronotum rather more convex and more coarsely sculptured, with the front marginal carina minutely angulated in the middle. In both sexes, in addition to the more coarsely sculptured elytra, the scutellum is rugose, except a very narrow outer margin, while in *D. cantori* it is smooth and shining.

*Dichodontus hexagonus*, Rits., is the female of *D. coronatus*, Burm., wrongly attributed to Malabar. This is one of the female Dynastinæ having at first sight all the appearance of a male. The unnecessary multiplication of names in the Lamellicornia is inevitable so long as the sex of specimens described is not first ascertained with certainty.

*Dichodontus fissicornis*, sp. n. (Pl. V. figs. 1, 2, 3.)

Rufo-piceus, nonnunquam niger, modice elongatus, pectore breviter rufo-hirto, clypeo toto rugoso, antrorsum angustato, margine antico recto, angulis minute rotundatis; prothorace antice a medio valde attenuato, angulis acutis, posticis obtusis, haud arcuatis, margine basali leviter trisinuato; scutello utrinque oblique sulcato, basi leviter ruguloso; elytris grosse, haud profunde, punctatis, postice plus minusve lævigatis, linea tenui suturali incisa:

♂, capite cornu gracili, valde curvato, ante medium paulo compresso, apice minute dilatato atque bifido, armato; prothorace postico medio late elevato, summo fere horizontaliter antrorsum producto, processu sat angusto, apice emarginato-truncato, thoracis superficie medio (processus latere inferiori excepto) lævi, lateribus grosse lunulate strigosis, marginibus lateralibus medio angulatis, antice valde, postice leviter, approximatis; elytris antice fere obsolete punctatis, postice fere lævibus; pygidio basi dense rugoso, medio crebre, apice parce, punctato:

♀, capite postice minute tuberculato; prothorace convexo, antice vix impresso, grosse et confluenter punctato, spatio subcirculari postico nitido, parce et minute punctato, lateribus antice valde approximatis, postice fere parallelis; elytris grosse sublineare punctatis; pygidio segmentoque ultimo ventrali dense et æqualiter rugosis, breviter rufo-setosis.

Long. 24–32 mm.; lat. max. 14–18 mm.

*Hab.* Borneo: Sarawak; Singapore.

This is nearly related to the Javan *D. cræsus*, F., but is a little smaller, the cephalic horn of the male in well-developed specimens is longer, more strongly curved, and bifid at the end, and the median process of the thorax is narrower. In a small male from Sarawak the cephalic horn is short and not at all bifid and the prothorax is abruptly vertical in front but not produced into a horn. The female has only a small tubercle upon the head, and is shorter, broader, and much more strongly punctured than the male.

Burmeister has bestowed upon a West-African species the name of *Phyllognathus bacchus*, but as the latter name was previously used by Mulsant for a variety of the European *Phyllognathus silenus*, its re-use is not admissible, and I have therefore changed the name of Burmeister's insect to *P. burmeisteri*.

I have found by examination of the type, now in the Oxford Museum, that the insect supposed by Burmeister and Lacordaire to be *Bothynus ascanius*, Kirby, is quite a different species with a very strong prothoracic tubercle and large and deep excavation in the male, and distinctly striated elytra. The false *Ascanius* with almost smooth elytra must be called by the name given to the female, *Bothynus medon*, Germ.

The genus *Corynoscelis* cannot, in my opinion, be retained as distinct from the older *Bothynus*, the females being practically inseparable. *Bothynus monstrosus*, Bates, is only a deformed specimen of *B. simplicitarsis*, Bates; and *Cratocnemus niger*, Blanch., which Lacordaire thought possibly a female specimen of *Thronistes*, seems to me to be more probably a *Bothynus*.

*Semanopterus depressus*, Hope, and *subæqualis*, Hope, are, I believe, synonyms of *S.* (*Phileurus*) *subcostatus*, Cast., Hist. Nat. Ins. ii. 1840, p. 116.

Papuana, gen. nov.

Corpus breviter cylindricum. Caput triangulare, cornutum aut tuberculatum. Clypeus truncatus. Mandibulæ detectæ, extu

uni- aut bi-incisæ. Mentum antice angustatum. Prosternum postice elevatum, truncatum, longe ciliatum. Pedes sat longi, tarsi antici breves. Tibiæ anticæ quadri- aut tri-dentatæ, posteriores truncatæ, longe spinosæ, tarsorum posticorum articulo primo triangulari.

♂. Caput cornutum. Prothorax antice retusus, plus minusve cornutus. Pedis antici unguis internus distortus.

Two species of this genus were described by Fairmaire under the name of *Pimelopus* (*P. hubneri* and *armicollis*), to which genus it is nearly related, differing in the more triangular head, truncate clypeus, and less abbreviated legs, of which the front tibiæ are four-toothed and the middle and hind tibiæ much less dilated from base to apex and fringed with long, not closely-set spines.

I have seen several species, all from the islands of Papua and Polynesia. The following is the typical species :—

*Papuana semistriata*, sp. n. (Pl. IV. figs. 4, 5, 6.)

Nigra vel piceo-nigra, nitida, pectore parce rufo-hirto; clypeo utrinque acute angulato, subtilissime punctulato, vertice utrinque rugoso; prothorace antice retuso, rugoso, dorso medio acuminato, angulis anticis acutis, posticis obtusis, basi trisinuato; scutello lævi; elytris fortiter striatis, striis annulate punctatis, suturalibus integris, reliquis postice abbreviatis, lateribus apicibusque fere lævibus; mandibulis valde porrectis, extus parum profunde uni-incisis:

♂, capite cornu gracili, antice planato, apice obtuso, armato; prothorace postice lobo elevato, summo acuminato, tuberculoque utrinque parvo, interdum obsoleto, munito, margine antico lateribusque, spatio laterali carina breve arcuata delimitato excepto, rugosis, superficie reliqua lævi (individuorum maximorum autem cornus basi antice etiam rugoso); pygidio punctato, medio fere lævi:

♀, capite tuberculo lato armato; prothoracis medio leviter acuminato, antice rugoso; pygidio crebre et minute punctato.

Long. 22–28 mm.; lat. max. 12–14 mm.

*Hab.* British New Guinea: Fly River; Amboina.

This is a larger species than *P. hubneri* and *armicollis*, Fairm., with more highly developed armature, although the latter is, of course, subject to great variation. The female, both in this and the following species, appears always to have a retuse and rugose area in the anterior part of the pronotum and a feeble but sharp elevation at the middle. The mandibles, in both sexes, are much more produced forwards and have only a single slight notch at the side. The elytra of *P. semistriata* are coarsely punctate-striate, the striæ,

with the exception of the sutural one, vanishing behind the middle. In large males the rugose area of the pronotum extends from the front to the hind margin on each side, but does not include the whole lateral part.

*Papuana lævipennis*, sp. n.

Nigra, nitida, sat lata, pectore parce rufo-hirto, clypeo utrinque acute angulato, subtiliter punctulato, vertice utrinque rugoso; prothorace antice retuso, utrinque rugoso, dorso medio acuminato, angulis anticis acutis, posticis obtusis, basi trisinuato; scutello lævi; elytris latis, lævibus, stria suturali profunda, indistincte punctata; mandibulis valde porrectis, extus parum profunde uni-incisis:

♂, capite cornu gracili antice planato, apice obtuso, armato; prothorace postice lobo elevato, summo acuminato tuberculoque utrinque parvo, interdum obsoleto, munito, margine antico lateribusque, spatio posteriori carina arcuata delimitato excepto, rugosis, superficie reliqua lævi (individuorum maximorum autem cornus basi antice etiam rugoso); pygidii lateribus crebre punctatis, medio lævi:

♀, capite tuberculo lato armato; prothorace medio leviter acuminato, antice rugose punctato, postice subtilissime parce punctulato; pygidio minute et crebre punctato.

Long. 20–29 mm.; lat. max. 11–16 mm.

*Hab.* Solomon Islands: Kieta.

This is extremely like *semistriata*, with which it agrees in all its structural details, but it is shorter and broader in proportion and the elytra are very smooth, with only a single sutural stria upon each.

*Papuana tridentipes*, sp. n.

Nigra, nitida, modice elongata, subtus picea, parcissime rufo-hirsuta; capite rugoso, clypeo antice sat late arcuato, utrinque minute reflexo-angulato; prothorace nitidissimo, vix perspicue punctato, lateribus fortiter arcuatis, angulis anticis acutis, posticis obtusissimis; scutello lævi; elytris grosse striato-punctatis, punctis annulatis, apicibus crebre et æqualiter punctatis; pygidio grosse rugoso-punctato; tibiis anticis acute tridentatis; mandibulis extus trilobatis:

♂, capite medio cornu parvo, recurvato, sat gracili armato; prothorace antice retuso, postice late producto, lobo utrinque breviter acuminato, lateribus pone angulos anticos obtuse ascendentibus; pygidio convexo; tarsorum anticorum ungue interno lato, haud acuto, integro:

♀, capite medio minute bituberculato; pygidio ante medium transverse carinato.

Long. 17–21 mm.; lat. max. 9–11 mm.

*Hab.* Trobriand Is.: Kiriwini (*A. S. Meek*).

Herr C. Felsche has received a series of specimens, of which he has kindly presented a pair to the British Museum. The species is smaller than those just described and differs from all hitherto known in having only three teeth to the front tibiæ. It is very smooth and shining above, with the elytra and the pygidium very strongly punctured. The male has a short but slender horn on the head and the pronotum is horizontally produced into a short broad lobe, sharply pointed on each side. The lateral margins also bear a blunt prominence on each side a little behind the front angles.

*Pseudohomonyx crassus*, sp. n. (Pl. V. fig. 6.)

Niger, nitidus, elongatus, pectore abdominisque lateribus rufo-hirsutis, capite sat æqualiter transversim plicato, clypeo antice attenuato, truncato; prothoracis lateribus tenuiter punctatis, antice paulo fortius, anguste marginatis; scutello vix punctato; elytris grosse punctato-striatis, stria secunda antice, 4ª et 5ª postice, abbreviatis, apicibus irregulariter grosse punctatis; pygidio antice punctato, postice lævi:

♂, prothorace antice sat late impresso, margine antico acute tuberculato; pygidio antice confuse annulato-punctato:

♀, prothorace omnino lævi; pygidio lateraliter grosse, medio subtiliter, punctato.

Long. 21–24 mm.; lat. max. 11·5–13 mm.

*Hab.* N. Borneo: Kina Balu, Labuan I., Sanga Sanga.

This is a species very closely related to *P. borneensis*, Arrow, but rather larger, with finer lateral margins to the pronotum and the elytral striæ coarse but less deep. The pygidium is also much less strongly sculptured in both sexes, with its apical half smooth and shining. The male has a much larger and deeper impression on the pronotum, about as wide as it is long, and a sharp conspicuous tubercle in front of it.

Labuan I. was erroneously included as a locality for *P. borneensis*.

Prof. Kolbe has proposed the name *Heteroligus* for various species formerly included in the genus *Heteronychus*, but which seem to me to include three well-marked generic types. As in the case of other genera created by him, Prof. Kolbe has contented himself with a very casual and fragmentary reference which affords no means of determining to which of these types his name ought to be applied. I therefore select as the type of *Heteroligus* the first enumerated and

commonest of the species mentioned by him, *H. claudius*, Klug, which, in my opinion, is the earlier described *H. meles*, Billb. A small, but peculiar, feature of this species is worthy of mention. The sexes of the Dynastinæ (and Rutelinæ) are almost invariably distinguishable by the form of the last ventral segment, which in the female is longer and more pointed behind than in the male. In the latter the apical part appears to be excised and replaced by a shining quasi-transparent membrane. In the male of *Heteroligus meles* this segment is narrow and the terminal membrane is broad and conspicuous. In the female, contrary to the usual condition, there is also an apical excision and membranous filling, but the excision is much narrower than in the male and its form is very curious, a bilobed process from the middle of its edge dividing it into two parts, which are fringed with stiff hairs.

This species is common in Sierra Leone and Nigeria, and extends eastwards as far as Uganda. Mr. Péringuey has described under its name (*H. claudius*, Klug) a form from Damaraland, but, as shown by the figure of its œdeagus, that is another species. It appears to be different from *H. brevis* and *geotrupinus* of Quedenfeldt, both of which are considerably smaller. It must therefore be renamed, and I propose to call it *H. péringueyi*.

The following is very closely related, but again distinct :—

*Heteroligus gazanus*, sp. n.

Piceus, subtus parce rufo-hirtus, ovatus, crassus, capite omnino ruguloso, tuberculis duo frontalibus distantibus, clypeo modice angustato, antice arcuato, prothorace undique crebre punctato, disco subtilius, tuberculis duo geminatis paulo ante marginem anticum ; scutello paulo irregulariter punctulato ; elytris crebre irregulariter punctatis, lineis quatuor indistinctis duplicis striaque suturali profunda, propygidio parum subtiliter transverse striato, pygidio parce subtilissime punctulato, angulis anticis crebre rugulosis :

♂, segmento ultimo ventrali brevi, late membranaceo :

♀, segmento ultimo ventrali longiori, apice anguste et simplice emarginato.

Long. 32–35 mm. ; lat. max. 19 mm.

*Hab.* Gazaland : Chirinda.

A pair has been presented by Mr. G. A. K. Marshall. This species has the closest possible resemblance to *H. meles*, from which the sexual characters referred to distinguish it most surely. The elytra are rather more coarsely and irregularly punctured and the smooth longitudinal lines

indistinct. The frontal tubercles of the head are more distant from one another. The œdeagus of the male is more like that of *H. péringueyi* than of *H. meles*, but is broader and without pointed processes in its anterior part.

*Heteronychus glabricollis*, Burm., included in *Heteroligus* by Prof. Kolbe, belongs to the genus *Cyphonistes* (= *Cephisodotus*, Fairm.), in which the front tibia is simply three-toothed and the front tarsi of the male are thickened. *Cyphonistes impressicollis*, Fairm., is apparently a synonym of the last.

*Heteronychus capreolus*, Qued., another insect placed by Prof. Kolbe in *Heteroligus*, is one of a group of species having well-marked characters in common for which another genus must be formed. The best-marked features are the truncate clypeus with spinose anterior angles and the very sharp, recurved teeth at the outer edge of the mandible. The species seem to be characteristic of the West African fauna. I propose to call them

### Prionoryctes, gen. nov.

Corpus convexum, subcylindricum. Clypeus brevis, lateribus convergentibus, antice truncatus, angulis acute et oblique spinoso-productis. Mandibulæ extus profunde incisæ, dentes tres acutas, valde recurvatas, utrinque instructæ. Maxillæ fortiter 6-dentatæ, dentibus 4 inferioribus geminatis, palporum articulo ultimo magno, truncato. Mentum antice profunde fissum, palporum articulo penultimo transverso. Mesosternum medio erectum, subcylindricum, summo truncato. Tibiæ anticæ acute quadridentatæ. Tibiæ posticæ extus apice dentibus circiter sex obtuse dentatæ. Propygidium striis stridulatoriis medio obsoletis sat late incisum. Tarsorum posticorum articulus primus supra productus. Mas et fœmina visu vix dissimiles.

I refer to this genus, in addition to *Heteronychus capreolus*, the three following species, the first of which may be regarded as the type.

### *Prionoryctes rufopiceus*, sp. n.

Rufo-piceus, subtus breviter rufo-hirsutus, capite toto rugoso, fronte medio leviter depressa, tuberculis duobus sat remotis armata; prothorace grosse, fere æqualiter, punctato, omnino marginato; scutello inæqualiter punctato; elytris annulato-punctatis, lineis punctorum quatuor geminatis striaque suturali profunda, interstitiis minute marginibusque externis confuse punctulatis:

♂, pygidio modice convexo, nudo, subtiliter coriaceo: pedis antici ungue interno basi dentato:

♀, pygidio deplanato, transverse striolato et parce irregulariter punctato, punctis setiferis.

Long. 29–32 mm.; lat. max. 15–16 mm.

*Hab.* S. Nigeria: Calabar, Gaboon.

The species was found by Du Chaillu in the Gaboon region and has been more recently taken by Col. F. Winn Sampson. It is the largest known to me and of a deep red colour, all the others being black. There is no trace of depression or tubercles behind the front margin of the pronotum. The punctures of the elytra are large and annular, and the intervening spaces are finely, but quite distinctly, punctulated. The outer margins are rather irregularly dotted with fine punctures only.

The inner claw of the front tarsus of the male of this species bears a small tooth beneath. The sexes also differ in the pygidium, which is more flattened and pointed in the female and transversely striolated, with scattered punctures bearing short erect setæ, while in the male it is convex, bare, and coriaceous.

*Prionoryctes caniculus*, sp. n.

Elongatus, niger, nitidus, corpore subtus breviter rufo-hirsuto, capite omnino rugoso, fronte medio leviter impressa, tuberculis duobus sat remotis instructa; pronoto toto marginato, grosse punctato, medii postice punctis paulo magis subtilibus, ante marginem anticum tuberculis duobus connatis fere obsoletis instructo; scutello leviter punctato; elytris grosse punctatis, lineis quatuor geminatis striaque suturali profunda, interstitiis sat crebre marginibusque externis creberrime punctulatis:

♂, pygidio convexo, nudo, subtiliter coriaceo.

Long. 28 mm.; lat. max. 13·5 mm.

*Hab.* S. Nigeria: Calabar.

A single male specimen has been presented by Col. F. Winn Sampson to the British Museum. It has the form but not the colour of *P. rufopiceus*, and is also differently punctured. The lines of large punctures upon the elytra are stronger and deeper, and the microscopic punctulation of the surface between the punctures at the lateral and apical margins is finer and closer. It is also distinguishable by the vestiges of a pair of tubercles behind the front margin of the pronotum, but there is no punctured depression as described in *P. capreolus*, Qued., nor is there a smooth median line extending to the posterior margin. The

inner claw of the front tarsus is not toothed as in the male of the last-described species.

*Prionoryctes breviusculus*, sp. n.

Breviter cylindricus, postice paulo ampliatus, niger, nitidus, corpore subtus picco-rufo, breviter rufo-hirsuto; capite omnino rugoso, fronte medio leviter impressa, tuberculis duobus sat remotis armata; prothorace toto marginato, grosse punctato, medii postice punctis paulo magis subtilibus, ante marginem anticum tuberculis duobus connatis fere obsoletis instructo; scutello paulo punctato; elytris punctatis, lineis quatuor geminatis striaque suturali profunda, interstitiis disperse marginibusque externis creberrime punctulatis; pygidio crebre et minute coriaceo:
♀, pygidio basi breviter setoso.
Long. 22·5 mm.; lat. max. 12·5 mm.

*Hab.* S. Nigeria: Lagos (*Ussher*); Liberia (*A. McCloy*). The Museum contains one specimen of each sex.

This is the smallest known species and has a rather short and compact form, the elytra broadest a little before the extremity. It is black above and strongly and deeply punctured, with very fine punctulations scantily sprinkled between the large punctures of the elytra, but densely crowded at the outer margins. The pygidium is convex and coriaceous in both sexes, and the puncture-bearing setæ in the female are confined to the base, and not, as in *P. rufopiceus*, scattered over the surface. The inner front claws of the male are not toothed.

In constituting his genera *Prosphileurus* and *Archophanes* Prof. Kolbe has omitted any reference to their sexual characteristics, perhaps because he knew only one sex. The latter genus exhibits almost the highest developed armature found in female Lamellicornia. A close similarity between the sexes is a feature of the group Phileurini, which is principally American, but the armature is generally little developed in the group. In the allied Oriental forms for which I have made the genus *Eophileurus*, and in most of the related African genera (e. g. *Rhizoplatys*), differences appear both in superficial configuration and in the front tarsi, and it is interesting to find Phileurini strayed so far from the metropolis of the group in which the armature is exceptionally developed and yet not sexual. The females of *Archophanes cratericollis*, Fairm., and *Prosphileurus poggei*, Har., and especially the former, are remarkably male-like. Both species seem to have a very wide range, the first extending

from the Cameroons to Uganda and the second from Sierra Leone to Angola.

Certain insects of this group which inhabit Madagascar do not belong to any existing genus; for these I constitute the following :—

### Hovophileurus, gen. nov.

Corpus elongatum, cylindricum. Caput triangulare, clypeo acuminato, apice reflexo. Mandibula extus obtuse dentata, apice acuminata, reflexa. Maxilla longe ac dense pilosa, dentibus duobus geminatis acutis inferioribus armata. Mentum elongatum, parabolicum, antice constrictum et bilobatum. Prosternum antice paulo acute productum, postice erectum, truncatum. Tibia antica acute tridentata, posteriores apice dilatatæ, multidentatæ et setiferæ. Tarsorum posticorum articulus basalis extus fortiter productus. Propygidium absque striis stridulatoriis.

♂. Tarsi antici articulus ultimus inflatus, ungue interno profunde bifido.

The genus is intermediate between *Phileurus* and *Rhizoplatys*. One of its species, *Hovophileurus sulcicollis*, Fairm., has been placed in the latter, but has not its principal diagnostic feature, viz. the dilated mentum partially concealing the palpi. The serrate extremities of the hind tibiæ and the erect and truncate prosternal process also distinguish the new genus. In addition to *H. sulcicollis*, Fairm., the two following species are in the British Museum :—

### *Hovophileurus sulcipennis*, sp. n.

Niger, nitidus, modice convexus, corpore subtus brunneo-piloso, capite ruguloso, antice acute producto, vertice medio tuberculato; pronoto undique parum æqualiter punctato, lateribus fortiter arcuatis, angulis anticis acutis productis, posticis obtusissimis sed vix rotundatis, dorso antice excavato, utrinque paulo acuminato, fossa laxe rugosa; scutello antice rugoso; elytris profunde sulcatis, sulcis annulato-punctatis, interstitiis inæqualibus, 2°, 6° et 8° latis, grosse punctatis, reliquis lævibus, alte convexis, apicibus planatis, grosse et crebre punctatis; metasterno sat dense rufo-hirto :

♂, pygidio valde convexo, æqualiter crebre rugoso :

♀, pygidio minus convexo, apice subnitido.

Long. 18–22 mm.; lat. max. 9·5–11·5 mm.

*Hab.* N. Madagascar : Diego Suarez.

The type in the British Museum is a male, and I have seen

a female from Dr. Sicard's collection. Except in the anterior claws the sexes differ little, but the pygidium of the female is less convex and less finely and evenly rugose than that of the male. The prothorax has in both sexes a deep median excavation which occupies nearly a third of the breadth of the thorax and has its walls slightly acuminate on each side in front. The elytra are deeply grooved, with large annular punctures in the grooves and similar ones upon some of the interstices, which are broader and less elevated than the rest. The metasternum is less densely hairy than that of *H. sulcicollis*, Fairm., but much more so than in the following species.

*Hovophileurus canaliculatus*, sp. n.

Niger, parum nitidus aut convexus, abdomine fusco-rufo, corpore subtus parcissime hirsuto; capite leviter ruguloso, antice acute producto, vertice medio tuberculato; pronoto toto fortiter sat crebre punctato, lateribus valde arcuatis, angulis anticis acutis, posticis obtusis sed bene indicatis, medio profunde et angusto canaliculato; scutello grosso punctato; elytris toto rugose punctulatis, profunde striatis, striis plus minusve crenatis, interstitio secundo antice et postice, 4° postice, 6° toto grosse seriatim, 8° et 10° irregulariter punctatis, apicibus planatis, grosse et crebre punctatis, metasterni lateribus crebre punctatis, parce pilosis: pygidio dense rugoso.
Long. 19 mm.; lat. max. 9 mm.

*Hab.* N. Madagascar: Diego Suarez.

The only specimen I have seen is a female in the British Museum. The prothorax has only a narrow median groove, its posterior angles are well-marked, the elytra have a close microscopic punctulation which produces a less shining appearance than that of the other two species, and the lower surface is only very scantily clothed with hair.

*Pentodon australis*, Blackb., cannot be allowed to remain in that essentially Palæarctic genus, to which its relationship is rather remote. It has the aspect and general characters of *Heteronychus*, from which it differs in the absence of stridulatory striæ upon the propygidium. Its nearest ally seems to be *Heteronychus australis*, Fauvel, described many years earlier from the female alone and inhabiting New Caledonia. The two species agree in having the glossy unpunctured pronotum, the thickened front tarsi in the male and other features of *Heteronychus*, as well as in the want of

stridulating apparatus, and I propose to put them together in a new genus, to be called

METANASTES, gen. nov.

The typical species is *M. australis*, Fauvel, and to avoid the double employment of the same name the later-described Australian insect must be renamed *M. blackburni*.

In the hitherto unknown male of *M. australis* the head has a single (instead of paired) tubercle and a rather deep pit behind it. No such sexual difference is found in *Heteronychus*, nor does it reappear in *M. blackburni*, but the females of the two species are so much alike that it appears to me impossible to separate them generically. In *M. australis*, Fauvel, the elytra are rather more closely and irregularly punctured than in *M. blackburni*, and the front tibiæ are simply tridentate, while in the latter there are one or two minute secondary teeth.

In the female of *M. australis* the pygidium is flat and in the male very convex.

The genus *Euetheola* was formed by Bates for the single species *Heteronychus humilis*, Burm., the author comparing it with *Dyscinetus bidentatus*, Burm. The latter insect, although differing from *E. humilis* in the thickened front tarsi of the male, is in other respects very closely allied to it. It differs entirely from *Dyscinetus* in its toothed clypeus and in the produced and exposed front part of the mandibles, as well as in its general aspect. The alternative is presented of transferring it to *Euetheola* or making another genus for it, and for the present I prefer the former course.

The following is a third closely related species:—

*Euetheola latipennis*, sp. n.

Nigra, nitida, elytris subopacis, brevis, postice lata, clypeo rugoso, antice angusto, bidentato, a fronte carina angulata divisa, fronte antice fortiter punctata, postice lævi; prothorace ubique grossissime punctato, toto marginato, lateribus fortiter arcuatis; scutello punctato; elytris haud profunde punctato-striatis, ad marginem anticum rectis, ad humeros acute prominentibus, postice dilatatis; pygidio grosse et confluenter punctato; corpore subtus nigro, nitido, lateribus rugose punctatis; tibiis anticis fortiter et acute tridentatis:

♂, tarsis anticis incrassatis, unguibus inæqualibus.

Long. 13–14 mm.; lat. max. 7·8 mm.

*Hab.* MATTO GROSSO: Cuyaba; PARAGUAY: Sapucay.

The sharply angulated shoulders of the elytra, which are traceable in *E. bidentata*, Burm., are here much more marked, and the elytra regularly increase in width from the shoulders to near the extremities. Their semiopaque surface and shallow striation are also very distinctive, as are the very coarsely punctured prothorax and pygidium.

One specimen was taken at Sapucay by Mr. W. Foster, and I have received a considerable series from Messrs. Staudinger and Bang-Haas.

*Pucaya pulchra*, sp. n. (Pl. IV. fig. 7.)

♂. Castanea, capite prothoraceque obscurioribus, hujus lateribus (puncto mediano fusco excepto) punctisque duobus transverse ante basin positis flavis, elytrorum fascia obliqua a basi usque ad angulum suturalem, circum marginem externum fere ad humerum recurrenti, pygidiique lateribus similiter coloratis: elongata, parallela, polita, capite rugose punctato, utrinque breviter acute cornuto, clypeo lato, margine recto, reflexo; prothorace transverso, vix punctato, medio leviter canaliculato, antice paulo retuso, lateribus fortiter arcuatis, angulis posticis obsoletis; elytris parce subtiliter punctatis, punctis nonnullis discoidalibus seriatis; pygidio lævissime punctato, sterno dense haud longe fulvo-hirto. Long. 20 mm.; lat. max. 10 mm.

*Hab.* Colombia.

The single male specimen in the British Museum was formerly in the Reiche Collection. Although closely similar in all points of structure to the typical species of this genus (*Pucaya castanea*, Ohaus), its bright orange markings render it of peculiar interest and seem to indicate a diurnal habit, like that of the species of *Cyclocephala*, in which, almost alone amongst the Dynastinæ, similar patterns are found. *P. castanea* has the sombre colouring characteristic of the subfamily, and, as Dr. Ohaus has recorded, is nocturnal.

*P. pulchra* is smaller than *P. castanea*, much more hairy beneath, and with a faint and scanty puncturing of the elytra which has wholly disappeared in the latter species. The head, on the contrary, is less roughly sculptured, the clypeal margin is more reflexed, and the horns are very short but acute; as in *P. castanea*, they immediately adjoin the inner edge of the eyes. The prothorax in the unique type specimen is less humped than in the other species, but bears marginal and median depressions of exactly the same form though less deep.

It seems probable from the description that the small Peruvian species called *Cyclocephala nodicollis* by Kirsch also belongs to this genus.

*Dyscinetus dytiscoides*, sp. n. (Pl. IV. fig. 13.)

Longe ovalis, parum convexus, flavus, corpore supra olivaceo-nigro, clypeo prothoracisque lateribus flavis; capite subtilissime sat parce punctulato, clypeo subquadrato, antice leviter emarginato; prothorace vix fortius punctato, margine antico vix angulato, postico immarginato, lateribus bene marginatis; scutello impunctato; elytris æqualiter haud fortiter punctatis, seriebus quatuor geminatis punctorum, lateribus omnino arcuatis, apicibus sat angustis, paulo setosis; pygidio haud tecto, rugose punctato, setoso, utrinque impresso; pedibus gracilibus, flavis:
♂, tarsis anticis paulo incrassatis, ungue majore profunde fisso.
Long. 19–22 mm.; lat. max. 10–12 mm.

*Hab.* Colombia, Venezuela.

This has a curious resemblance to a water-beetle of the genus *Dytiscus* in its outline and coloration, as well as in the texture of the surface. Its very elongate oval shape, the pale lower surface, legs, and sides of the prothorax produce an appearance which immediately distinguish it from every other known species of *Dyscinetus*.

*Stenocrates ligneus*, sp. n.

Castaneus, vertice utrinque prothoracisque maculis duabus magnis discoidalibus fuscis, elytrorum disco plerumque vage obscuriore, corpore subtus pedibusque flavo-castaneis; ovalis, parum convexus, fere nudus, pedibus brevissimis, clypeo rugoso, brevi, truncato, margine reflexo, antice subtilissime sinuato, vertice parce punctato; prothorace grosse, haud dense, punctato, lateribus regulariter arcuatis; scutello punctato; elytris crebre punctatis, seriebus tribus discoidalibus punctorum regulariter geminatis; pygidio grosse punctato; corpore subtus lævi, metasterni lateribus paulo punctatis; maris et fœminis fere similibus.
Long. 12–15 mm.; lat. max. 6–8 mm.

*Hab.* Brazil: Manaos, Ega.

This is an isolated species both in form and colour. It is the only not-black species known to me, and its closely punctured elytra give it an unusually dull appearance. Its short depressed form and very short legs in both sexes seem to indicate habits different from those of its congeners. The hind tibiæ are rather less flattened than usual, and the clypeal suture, though well marked, is not carinate. The insect appears to resemble *Dyscinetus luridus*, Burm., in coloration, but the description of the pygidium &c. of that species shows that it is not the same.

A specimen was taken at Ega by H. W. Bates, and I have received a series collected at Manaos.

The insect for which Bates formed the genus *Barotheus* (*B. andinus*, Bates) appears to be without doubt the *Ancognatha castanea* of Erichson. The latter described the antennæ as 9-jointed and the former called them 10-jointed, the fact being that, as in the species next mentioned, the number of joints is inconstant, and I have examined a specimen in which there are nine joints to the right antenna and ten joints to the left. The species must be called *Barotheus castaneus*, Er., Bates's name, as well as the name *peruana*, given by Harold, being synonymical.

*Ancognatha æquata*, Bates, is synonymous with *A. manca*, Lec., and the specimen to which the latter name was given by Bates (Biol. Centr.-Amer., Col. ii. 2, p. 298) is a variety or allied species in too fragmentary a state for exact determination. *A. manca* is described as characterized by having only nine joints to the antenna. This is due to the more or less complete fusion of the fifth and sixth joints, which occurs also in other species, but is not constant. When the fusion is incomplete the antenna appears either 9- or 10-jointed, according to the side on which it is examined. As in the preceding case, 9- and 10-jointed forms may be found in the same species, and in one specimen which I have examined one antenna must be described as 9-jointed and the other as 10-jointed.

*Ancognatha vulgaris*, sp. n.

The species of which both sexes were figured by Bates under the name of *A. humeralis*, Burm. (Biol. Centr.-Amer., Col. ii. 2, p. 298, pl. 17. figs. 13, 14), is a quite distinct species, although superficially very similar. I have seen a long series of *A. humeralis*, Burm., from Cauca, Colombia. In this form, as mentioned by Burmeister, the pygidium is smooth, with a thick tuft of hairs at the end. The species figured by Bates is larger and the pygidium is entirely clothed with hairs in the male and fringed in the female. The female has a very strong lateral lobe near the middle of each elytron, which is absent in *A. humeralis* and all other species of *Ancognatha* known to me. The unnamed species may be called *A. vulgaris*. It ranges from Panama to Peru and the Upper Amazons (Nauta).

Bates has associated two species as the two sexes of *Ancognatha quadripunctata*, Bates. I believe only the single male specimen figured really belongs to it. The other specimens are of very different appearance and not closely

related to the type. Both sexes of this species are represented in the British Museum, and I here describe it as

*Ancognatha falsa*, sp. n. (Pl. IV. fig. 10.)

Pallide testacea, clypei margine, utriusque lateris elevatione parva verticeque extremo, elytrorum utrinque maculis postscutellari et humerali genubusque nigris : supra nitidissima, capite subopaco, rude punctato, prothorace parce et minute punctato, haud lato, antice paulo angustato, elytris obsolete lineato-punctatis ; pygidio parcissime punctato ; utriusque sexus tarsis brevibus :

♂, pedum anticorum ungue majori apice minutissime fisso ; pygidio parce fulvo-hirto :

♀, elytrorum lateribus haud dilatatis.

Long. 17–23 mm.

*Hab.* Mexico : Peras, Capulalpam, Mexico City.

Although he did not record the locality, Bates also united with *A. 4-punctata* a specimen from Guatemala of another species allied to *A. falsa*. This is here described from examples of both sexes.

*Ancognatha sellata*, sp. n.

Longe ovata, postice sat lata, testacea, polita, capite toto infuscato, elytris antice nigro-maculatis, macula nigra postice ad marginum interiorum et exteriorum medium producta, tibiis extus tarsisque nigris ; capite leviter minute punctato, clypeo longo, vix acuminato ; prothorace scutelloque vix punctatis, illius lateribus a basi arcuatim approximatis, angulis posticis parum rotundatis ; elytriis parcissime punctatis ; metasterno dense, pygidio abdomineque parcius fulvo-hirtis.

Long. 18–24 mm. ; lat. max. 10–12 mm.

*Hab.* Guatemala : San Marcos (El Rincon).

The sharp-pointed clypeus, falciform mandibles, and very convex prothorax of *A. 4-punctata* are wanting in this species as in *A. falsa*. It is very like the latter, but differs by the black head and large black patch occupying the anterior part of the elytra and produced to about the middle of the inner and outer margins. The sides of the thorax are less strongly rounded and the hind angles more marked. The two sexes are similar, the pygidium being thinly hairy in both.

*Cyclocephala ocellata*, Burm., was placed in the now-restricted genus *Ancognatha* on account of the clypeus, and was attributed by Burmeister to Mexico. It is a Brazilian species taken at Ega by Bates.

The name *nigrocephala* applied by Schönherr to Olivier's *C. melanocephala* (pronounced by Illiger to be distinct from the *melanocephala* of Fabricius) had been previously used by De Geer, and I have therefore called the species *G. olivieri*.

*Cyclocephala stolata*, Er., is evidently synonymous with *C. dispar*, Herbst (=*C. dorsalis*, Burm.).

*Cyclocephala pubescens*, Burm., must be added to the list of Central-American species, the examples from Nicaragua and Panama assigned by Bates to *C. lucida*, Burm., really belonging to the former, first recorded from Peru. It was independently described with the name *pubescens* by both Burmeister and Erichson; but Dr. Ohaus states that the types of both authors had the same origin, and, although the descriptions differ greatly, there is no doubt that they represent varieties of the same species. *C. pubescens* and *C. lucida* belong to a group of very closely related and variable forms which all pass through a range of almost identical colour-phases. The typical phase of *C. lucida* appears to be confined to Mexico. The specimens from Guatemala (Zapote) form a smaller and less spotted variety. *C. pubescens*, which replaces it to the south, is with difficulty distinguishable from this variety, but in the female the lateral lobe of the elytra forms a minute but very prominent tongue, whereas in *C. lucida* it is an obtuse angulation. The œdeagus of the male is rather more slender.

The following is another very closely related species :—

*Cyclocephala venezuelæ*, sp. n.

Rufo-testacea, nitida, capite toto, vittis pronoti duabus postice abbreviatis, elytrorum marginibus anticis et lateralibus (his postice abbreviatis), macula circumscutellari ad marginem connexa punctisque utrinque tribus, tibiis tarsisque nigris; capite sat fortiter punctato; prothorace elytrisque parce haud profunde punctatis; abdomine cum pygidio fulvo-hirto:

♂, pedibus anticis multo crassatis:

♀, elytris extus post medium obtuse dilatatis.

Long. 19–22 mm.; lat. max. 10–12 mm.

*Hab.* Venezuela.

This closely resembles *C. lucida*, but is rather more shining and scantily punctured. It differs also by its black head, tibiæ and tarsi, the two thoracic marks which reach the front margin, but are curtailed behind, and the black margin to the anterior part of the elytra, which unites with

the large juxtascutellar spots. It is equally closely allied to *C. tutelina*, Burm., in which the small elytral spots are absent and the lateral lobe of the elytra in the female is smaller and more abrupt.

Two species have received the name of *C. villosa*, the first being a Bolivian species of Blanchard's. I propose to substitute *borealis* for *villosa*, Burm., a North-American insect.

*Chalepus leucophthalmus*, Fisch., appears to me from the description to be *Cyclocephala melanocephala*, F., or one of the two or three closely similar species.

A peculiar sexual difference characterizing a large proportion of the species of *Cyclocephala* has been overlooked. It occurs in the mandibles, those of the male being conspicuously toothed externally at the extremity. This is very apparent in the following new species :—

*Cyclocephala gregaria*, sp. n. (Pl. IV. fig. 11.)

Nigra, prothorace, scutello, elytrorum macula utrinque media, vitta suturali juncta (hac apice plerumque dilatata), abdomine pectoreque plus minusve fulvis vel rufis ; breviter ovata, corpore supra et subtus plus minusve fulvo-hirsuto (feminis autem interdum fere glabris) ; clypeo sat magno, antice truncato, rugoso, vertice punctato ; prothorace parce subtiliter punctato ; scutello paulo punctato ; elytris inæqualiter haud profunde punctatis :

♂, subtiliter punctata, sat dense et longe pilosa, pygidio precipue, mandibulis apice extus recte reflexis, tarsis anticis crassis, ungue majori minute fisso :

♀, elytris grossius et magis seriatim punctatis, paulo hirsutis, pygidio nitido, parce punctato et hirsuto, elytrorum lateribus multo post medium valde angulatis.

Long. 17–21 mm. ; lat. max. 9·5–11 mm.

*Hab.* Colombia : Medellin (*Buckley*), Cauca Valley ; Ecuador : Macas (*Buckley*).

Var. *pallida*. Fulva, capite, pedibus, pectoris lateribus, elytrorumque marginibus a basi ad partem tertiam fuscis.

*Hab.* Medellin.

I have received this from Messrs. Staudinger and Bang-Haas with the unpublished name I have adopted. It is nearly related to *C. conspicua*, Sharp, but differs in its hairy clothing and immaculate pronotum. The markings are very variable. In one specimen the elytra are black, with a large quadrate reddish patch near the middle of each. Normally there is also a stripe of the same colour upon the posterior

half of the suture, becoming united with the median patches. The sutural stripe may become dilated along the posterior margin and the concurrent enlargement of the median patches ultimately reduces the black parts to very narrow limits.

The sexual differences are very marked. The male is much more hairy than the female and the latter has the elytra much more strongly punctured and very abruptly angulated behind the middle of the outer margin.

*Cyclocephala rufovaria*, sp. n. (Pl. IV. fig. 14.)

Nigra, prothoracis plagis tribus (externis irregularibus, media lineata), scutello, elytrorum fascia mediana angulata maculaque subapicali communi late V-formi fulvis vel rufis; sat breviter ovata, clypeo lato, truncato, transverse rugoso, fronte prothoraceque irregulariter haud dense punctatis; scutello paullo punctato: elytris irregulariter sed distincte punctatis; pygidio subtiliter parce punctato, late rufo-setoso:

♂, tarsis anticis crassatis, ungue majori minute fisso, mandibulis extus productis:

♀, elytrorum lateribus post medium acute angulatis.

Long. 17–19 mm.; lat. max. 9–10 mm.

*Hab.* Ecuador (*Buckley*); Peru.

This also is closely related to *C. conspicua*, Sharp, and, like it, smooth and shining, but the abdomen, with the pygidium, is black and the pattern a little different. There is a black spot at each lateral margin of the pronotum and the two median black lines extend from the front to the hind margin, where, as well as at the middle, each gives off an external branch. There is no posterior red sutural stripe upon the elytra. In the female the elytra are very sharply toothed behind the middle of the outer edge, much more so than in *C. conspicua* or *C. gregaria*.

*Cyclocephala carbonaria*, sp. n.

Nigra, nitida, glabra, capite magno, clypeo fere semicirculari, antice impunctato, postice cum fronte et pronoto parce sed distincte punctatis; hoc lato, lateribus late marginatis, basi immarginato; scutello minute punctato; elytris parallelis, grosse punctatis, punctis plerumque in seriebus ordinatis, in lateribus et apicibus minoribus et irregularibus; pygidio modice punctato, apice fere lævi:

♂, pedibus anticis incrassatis, ungue majori valde incurvato, apice minute fisso; tibiæ dente supero recte truncato.

Long. 19·5–22·5 mm.; lat. max. 11–12 mm.

*Hab.* Nicaragua: Chontales (*Janson*); Panama: Chiriqui.

Two specimens in the British Museum formed part of the Fry Collection, and a series was sent to me by Messrs. Staudinger and Bang-Haas. I have placed the species in *Cyclocephala* rather than in *Dyscinetus* on account of the large, smooth clypeus, of which the suture is obliterated, and the shape of the mandibles, which are bluntly produced in front. In its size, shape, and general appearance the insect resembles *C. variolosa*, Burm., but the clypeus is regularly rounded and the pronotum is not margined behind. The female is without the lateral expansion of the elytra occurring in that of *C. variolosa*, and another peculiar feature is found in the truncation of the uppermost tooth of the front tibia of the male.

*Cyclocephala latipennis*, sp. n. (Pl. IV. fig. 12.)

Piceo-nigra, glabra, nitida, lata; capite grandi, clypeo elliptico, margine alte reflexo, antice impunctato, postice cum fronte et pronoto minute et sparse punctatis, hujus lateribus paulo deplanatis, marginatis, basi immarginato; scutello vix punctato; elytris latis, latitudine maximo post medium; grosse haud crebre punctatis, punctis plerumque seriatim ordinatis; pygidio glabro, fere impunctato:

♂, tarsis anticis incrassatis, ungue majori valde incurvato, apice minute fisso.

Long. 25 mm.; lat. max. 14 mm.

*Hab.* Ecuador: Macas (*Buckley*).

A single male was acquired with the collection of the late Alexander Fry. It is closely related to the species just described, but larger, much broader, and less strongly punctured, the head, pronotum, and pygidium being very smooth and shining. The last joint of the front tarsus (in the male type specimen) is of enormous size.

*Cyclocephala liomorpha*, sp. n.

Rufo-testacea, elytris læte flavis, sutura marginibusque externis nigris, macula juxta-scutellari ovali, alia humerali, tertia magna mediana, his saturate brunneis, nigro-circumdatis, lineolaque apicali nigra; corpus elongato-ovatum, fere glabrum, clypeo semicirculari, subtiliter punctato-rugoso, fronte et pronoto nitidis, leviter punctatis, hoc transverso, antice angustato, angulis posticis toto rotundatis; scutello distincte punctato; elytris late sed distincte lineato-punctatis:

♂, pygidio subtiliter coriacco, pedum anticorum tarsis crassis, ungue interno dilatato, minute fisso, tibia antica acute bidentata:

♀, elytris extus medio obtuse angulatis, pygidio crebre punctato, pedum anticorum tarsis simplicibus, tibia tridentata.

Long. 12–13 mm.; lat. max. 6·5–7·5 mm.

*Hab.* Brazil : Ega.

Two males and a female were collected by H. W. Bates. It is a pretty and conspicuous species, recalling by its colouring and superficial appearance one of the Erotylidæ, or the similarly decorated Carabidæ of the genus *Lia*, which inhabit the same region. The body and legs are of a brick-red colour, except the elytra, which are bright yellow and each decorated with four spots, of which the two anterior and the large median one are mahogany-red encircled by black.

*Cyclocephala flora*, sp. n. (Pl. IV. fig. 9.)

Læte testacea, vertice nigro, pronoti medio late brunneo, elytris rufis, singulo paulo ante medium macula magna flava circulari fusco-circumdato ornato ; corpus ovatum, glabrum, clypeo parvo, subtruncato, rugoso, margine reflexo, fronte sat fortiter punctata ; prothorace scutelloque nitidissimis, rare et minute punctatis, illo haud lato, antice angustato, angulis posticis omnino rotundatis ; elytris ad ultra medium nitidis, subobsolete seriato-punctatis, deinde densissime et subtilissime rugosis, toto opacis ; pygidio nudo, subtiliter parce punctato ; tibiis anticis acute tridentatis : ♀, elytrorum lateribus post medium obtuse angulatis et callosis. Long. 14·5 mm. ; lat. max. 8 mm.

*Hab.* Peru : Nauta.

This peculiar and beautiful species is described from a single specimen taken long ago by Degand at Nauta on the Upper Amazons. It is a female and it is possible that the strongly contrasting opaque apical part of the elytra is a feature of that sex alone. I have described a similar, but much less developed, condition in the female of the West African *Ruteloryctes tristis*, and in an allied group the same sexual phenomenon appears in the Indian *Anomala rugosa*, Arrow. This peculiar surface distinguishes it immediately from all other known species of *Cyclocephala*, but its colouring is no less distinctive. It is yellow beneath and red-brown above, with broad lateral borders to the pronotum, the scutellum and a large round spot about the middle of each elytron are of a bright orange colour and the spots are broadly ringed with black.

*Cyclocephala brevissima*, sp. n. (Pl. IV. fig. 8.)

Nigra, singulo elytro macula antica sanguinea alteraque postica ornato, his plerumque confluentibus, aut immaculato ; corpus latum, brevissimum, fere discoidale, subtus cum pygidio (elytrisque minutissime) fulvo-setoso ; capite parvo, modice punctato,

clypeo angusto, truncato, prothorace nitido, convexo, ubique minute punctato, lato, lateribus fortiter arcuatis, angulis posticis rotundatis, basi medio breviter lobato ; scutello punctato ; elytris sat crebre et æqualiter rugoso-punctatis, lateribus postice densius ; pedibus brevibus, tibiis anticis acute tridentatis, dente superiori parvo, sed acutissimo, prope basin obsito :

♂, clypei margine valde reflexo, tarsis anticis crassissimis, ungue majori dilatato, minute fisso :

♀, elytrorum marginibus post medium subito contractis.

Long. 14·5–16 ; lat. max. 8·5–9 mm.

*Hab.* Guiana : Cayenne ; Brazil : Para.

This species occupies a very isolated position by its exceedingly short and broad form and the toothing of the front tibia; the latter is very short and has its uppermost tooth near the base and small but very sharp. The elytra may be entirely blood-red, except the margins, the red colour may divide into an anterior and posterior patch upon each, or the whole body may be black.

The figures of *Cyclocephala* and allied forms upon Plate IV. accompanying this paper serve only to indicate their outlines, the red and yellow colours appearing black upon the photograph. Upon Plate V. have been included figures of *Golofa antiqua* and *argentina*, described by me in the last volume of this Magazine (pp. 138, 139).

## EXPLANATION OF THE PLATES.

### Plate IV.

*Figs.* 1, 3. *Dipelicus borneensis*, sp. n., ♂.
*Fig.* 2. —— ——, ♀.
*Figs.* 4, 6. *Papuana semistriata*, sp. n., ♂.
*Fig.* 5. —— ——, ♀.
*Fig.* 7. *Pucaya pulchra*, sp. n.
*Fig.* 8. *Cyclocephala brevissima*, sp. n.
*Fig.* 9. —— *flora*, sp. n.
*Fig.* 10. *Ancognatha falsa*, sp. n.
*Fig.* 11. *Cyclocephala gregaria*, sp. n.
*Fig.* 12. —— *latipennis*, sp. n.
*Fig.* 13. *Dyscinetus dytiscoides*, sp. n.
*Fig.* 14. *Cyclocephala rufovaria*, sp. n.

### Plate V.

*Figs.* 1, 3. *Dichodontus fissicornis*, sp. n., ♂.
*Fig.* 2. —— ——, sp. n., ♀.
*Figs.* 4, 5. *Golofa antiqua*, Arrow, ♂.
*Fig.* 6. *Pseudohomonyx crassus*, sp. n., ♂.
*Fig.* 7. *Golofa argentina*, Arrow, ♂.
*Fig.* 8. —— ——, ♀.

## XVIII.—*On a new Lithonine Sponge from Christmas Island.*

By R. Kirkpatrick.

When looking over some pieces of rock dredged by me from 50 fathoms off Christmas Island, I came across two thin, vitreous-white crusts, which were found to be Lithonine sponges.

The larger crust, which covers an area of about 35 millimetres, is about 0·75 mm. thick in the centre, fining away to a very thin edge. When magnified, the surface shows a network of circular holes 0·09 mm. in diameter, and sharp conical spikes rising up vertically about 0·12 mm. At the bottom of the holes or pits and at the edges of the sponge a dense white crust is visible. No surface membrane or soft tissues remain, but loose spicules are visible, imbedded in the skeleton.

The latter is constructed of fused four-rayed spicules, the apical rays of which form the long conical surface spines, and the other three facial rays the walls of the pits. The dense basal crust is formed of much smaller, four-rayed, densely packed spicules. The facial rays are cylindrical and end each in a circular articulating surface. The under surface of the crust has almost the appearance of a mosaic, the facets being formed by the articular ends of the facial rays of the small four-rayed spicules.

The loose spicules are mostly monaxons, curved at one extremity, running to a sharp point at one end and rounded at the other. The average size is $120 \times 3{\cdot}5\ \mu$. One spicule appears to be bifurcated at one end, and may be regarded as a three-rayed form.

The sponge seems to me to belong to a new species of *Plectroninia*, Hinde, and I propose to call it *Plectroninia deansii*, after Captain J. Deans, by means of whose skill the specimens were obtained.

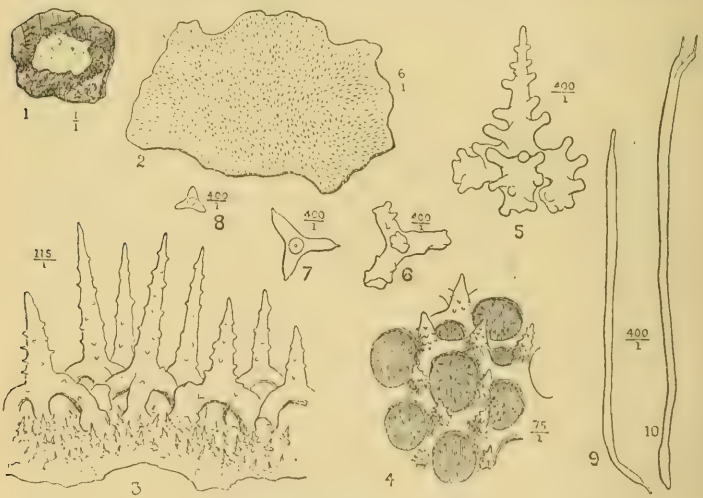
Three other species of this genus are known, viz.: *P. halli*, Hinde, a knob-shaped species from the Eocene of Victoria; *P. hindei*, Kirkp., a thin incrusting form from 50 fathoms off Funafuti; and *P. assindiæ*, Welter, a knob-like species from the Greensand of Essen.

The distinguishing feature of *P. deansii* lies in the character of the loose spicules.

In a paper on the Pharetron Sponge *Murrayona* (Proc. Roy. Soc. 1910, p. 124) I divided the family Pharetronidæ into three subfamilies, Dialytinæ, Lithoninæ, and Murrayoninæ, and stated that my classification was the same as that

given by Minchin (Lankester's 'Treatise on Zoology,' Porifera, p. 110); but my statement was partly incorrect, for the Dialytinæ, in my sense, included only one genus in Minchin's long list, viz. *Lelapia*, the whole of the rest of the genera in that list coming under Lithoninæ and Pharetroninæ (see below).

Concerning the theory of the nature of the "Pharetron fibre," Rauff, in his great work 'Palæospongologie' (Palæontographica, Bd. 40), expresses the belief that the spicules of the fibre were simply in apposition in the living sponge, and that they have been cemented into solid fibres during the process of fossilization. Steinmann ('Palæontologie,' ed. 2, 1907) considers that the spicules have been joined together by a cement formed by the living sponge.




*Plectroninia deansii*, sp. n.

Fig. 1.—Specimen incrusting rock. Nat. size.
Fig. 2.—The same. × 6.
Fig. 3.—Side view near edge of sponge. × 115.
Fig. 4.—Surface view. × 75.
Figs. 5–8.—Small four-rayed spicules of various sizes. × 400.
Fig. 9.—Monaxon spicule. × 400.
Fig. 10.—Triaxon spicule. × 400.

My own investigation of certain recent Pharetronid sponges inclines me to the belief that Steinmann's theory is the true one. Among living Pharetrones we find, however, some with spicules uncemented (*Lelapia*, *Kebira*), and others again with cemented spicules (Lithonnæ). A revised classification of Pharetrones, based partly on that of Minchin and partly

on that of Steinmann and Welter (Verh. Ver. Rheinland, 1910, p. 1), would be as follows :—

Family **Pharetronidæ**, Zittel *.—Heterocœla with spicules united into bundles and fibres. (Tuning-fork spicules often present.)

Subfamily 1. Dialytinæ, Rauff.—Spicules not cemented. (*Lelapia, Kebira.*)

Subfamily 2. Pharetronidæ, Steinmann.—Spicule-bundles cemented into solid anastomosing fibres.

Subfamily 3. Lithoninæ, Döderlein.—Anastomosing fibres formed of 4-rayed spicules cemented together.

Subfamily 4. Murrayoninæ, K.—Fibres of main skeleton formed of calcareous substance (? cement), without an axial core of spicules.

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## XIX.—*Descriptions and Records of Bees.*—XXXVII.†

By T. D. A. Cockerell, University of Colorado.

### *Dianthidium sinapinum*, sp. n.

♀.—Length about 8 mm.

Compact, light mustard-yellow, with black and pale dull ferruginous markings; head, thorax, and abdomen densely and strongly punctured; head large; eyes pale olivaceous; mandibles with the cutting-edge broad, dark brown, having only the apical tooth and a rather poorly developed second one; clypeus quadrate, its lower margin denticulate; scape yellow; flagellum ferruginous, the apical two-thirds dusky, the end of the last segment blackish; ocellar region black, sending a broad black stripe downward to each antennal socket, or these black markings may be evanescent and largely replaced by pale reddish; upper part of clypeus and sides of face sometimes stained with reddish; mesothorax with a broad median black band, expanding posteriorly, and two broad sublateral ones, ending in front at level of front of tegulæ, or these bands may be narrower and broadly edged with ferruginous; hair of face, sides of thorax, and ventral scopa pure shining white; anterior margin of mesothorax with appressed white hair, the rest with scanty

* A writer in 'Nature' (Jan. 12, 1911, p. 345) objects to the use of the term Pharetronidæ on the ground that there is no genus *Pharetron*.

† An error occurs in part xxxv. ('Annals,' 1911, vii. p. 311): Sigiri is in Ceylon, not in N.W. India.

yellowish hair, and scutellum with longer yellow hair; scutellum projecting, rounded, thin-edged, emarginate but not dentate; axillæ obtusely but evidently angled; lower part of occiput and opposing part of prothorax black, the latter with a large round yellow spot on each side; middle of metathorax blackened; tegulæ yellow, with a large pale ferruginous spot and hyaline margin. Wings hyaline, broadly infuscated apically, and with a dark streak in marginal cell; stigma red with a dark margin; nervures piceous; b. n. meeting t.-m.; second r. n. going well beyond end of second s.m. Legs bright yellow without markings, the small joints of tarsi becoming reddish; pulvillus rudimentary. Abdomen yellow, with the hind margins of the segments pale ferruginous, and a narrow longitudinal black or partly reddish line or band running down the middle of the first three or four segments.

*Hab.* Karachi, N.W. India (*E. Comber*). British Museum.

This belongs to the *bellicosum*-group of *Dianthidium*, and is aberrant for the genus, approaching *Proanthidium*. It nearly agrees with the description of *Anthidium saltator*, Nurse, from Deesa, but differs by the broadly darkened apical margins of the wings and the absence of dark markings on the legs. It is just possible that it is only a race of *saltator*. Structurally, there is much resemblance to *A. subochraceum*, Walker.

*Dianthidium rasorium* (Smith).

*Anthidium rasorium*, Smith, 1875. India.

*Proanthidium soliferum*, sp. n.

♀.—Length about or not quite 7 mm.

Black, marked with pale yellow; head and thorax densely punctured; abdomen shining, with the punctures well separated; ventral scopa pure white; mandibles quadridentate, yellow, with the teeth black, and the subapical corner broadly red; clypeus high, differing from that of *oblongatum* in the concave lateral outlines; clypeus, lateral face-marks covering lateral areas up to a little above antennal sockets, and broad lower border of supraclypeal area sending a band upwards on each side and a little tooth in middle, all *yellow*; front entirely black; a broad yellow band almost entirely covering cheeks and continuous across top of head; antennæ black, the apical margin of the scape narrowly dark red, and the flagellum obscurely reddish

beneath; tubercles yellow, sharply keeled; mesothorax with broad yellow lateral bands, pointed behind, and extending along the anterior margin for some distance, their ends here abruptly truncate; scutellum projecting, broad and short, almost straight-edged, emarginate in middle, not toothed, the sides occupied by a pair of large triangular yellow patches, the axillæ, which are not toothed or angled, also yellow; pleura with white hair; tegulæ bright ferruginous, with a yellow spot in front. Legs bright ferruginous, with the following parts *pale yellow*: lower side of anterior femora, posterior side of middle femora, subapical spot on hind femora, and outer side of all the tibiæ. Wings dusky, darker in marginal cell and apical field; b. n. going far basad of t.-m.; second r. n. going well beyond end of second s.m. Abdomen with five broad pale yellow bands, broadly interrupted on first three segments, more narrowly on fourth, not quite completely on fifth; last two segments entirely black. No pulvilli.

♂.—Similar, but yellow markings brighter, those of head stained with reddish; mandibles tridentate; lower margin of clypeus fringed with white hair; front with a large inverted-cup-shaped yellow patch; posterior edge of scutellum very straight, and emargination not evident; pleura with a small yellow spot. Wings very dark; legs nearly all yellow, reddish basally, hind femora marked with black behind; end of abdomen very simple, without lateral teeth, the apex broadly shallowly emarginate, the lobes subangulate, the structure not unlike that of *Anthidium alpinum*, Morawitz.

*Hab.* N.W. India (*E. Comber*). British Museum. Type (♀) from Karachi; male from "Shpali."

The male of *P. soliferum* nearly agrees with the description of female *Anthidium flavomaculatum*, Cam., from Poona, but it is larger, with darker wings, and must, I think, be different, even if the supposed female *flavomaculatum* should prove to be really a male.

### *Anthidium friesei*, n. n.

*Anthidium flavomaculatum*, Friese, Apidæ von Argentina, 1908, p. 70. Argentine Republic. (Not *A. flavomaculatum*, Cameron, 1897.)

### *Anthidium ternarium*, sp. n.

♂.—Length about 11½ mm.

Black with bright chrome-yellow markings; face narrow,

facial quadrangle much broader than high; clypeus, lateral face-marks (reaching to level of antennæ, but the upper end receding from eye), mandibles except apex, occipital band interrupted in the middle, anterior lateral corners of mesothorax (forming a sort of ⌊), axillæ, large mark on each side of scutellum, underside of anterior and middle femora, patch at apex of hind femora, outer side of tibiæ and basitarsi, very broad abdominal bands on segments 1 to 6 (interrupted widely on first segments, successively more narrowly on the others), and seventh segment (except in middle, and ends of lateral teeth), all *bright yellow*; lower margin of clypeus dark; antennæ black; sides of face, and front, with much white hair; cheeks and pleura with much white hair; hair of head and thorax above very pale ochreous-tinted; scutellum rounded, emarginate in middle; tegulæ yellow in front, piceous behind, except the margin. Wings dusky; b. n. going basad of t.-m.; first r. n. entering extreme basal corner of second s.m., and second r. n. going hardly beyond its end; hind femora with an obtuse subbasal tooth beneath. Sides of abdomen with white hair; fifth segment with a yellow tooth on each side, sixth with longer teeth, which are largely black; apical segment with three teeth, the middle one short, the others rather longer, directed outwardly.

*Hab.* Quetta, Sept. 1909 (*E. Comber*). British Museum.

In Friese's table of palæarctic species this runs to 36, and agrees with *A. florentinum* in the diverging apical teeth of abdomen, but with *A. septemspinosum* in having white hair at sides of abdomen, instead of bundles of ochreous hair. Compared with *A. florentinum*, it differs conspicuously in the much shorter apical teeth of abdomen. Nurse states that *A. florentinum caucasicum* (Rad.) is common in the alfalfa fields at Quetta, and I naturally expected this insect to be identical with it. I have never seen authentic *caucasicum*, but, as described by Friese and Dusmet y Alonso, it is a colour-variety of *florentinum*, not differing structurally.

*Allodape pumilio*, sp. n.

♀.—Length a little over 4 mm.

Black, with clear hyaline wings; stigma and nervures pale testaceous; labrum very dark reddish, with large punctures; mandibles black: pale ochreous-tinted face-mark with the upper part broad as usual, the lower narrower, parallel-sided, not expanded laterally; front and sides of vertex shining; flagellum dark reddish beneath; tegulæ hyaline-testaceous with a cream-coloured spot; tubercles

cream-colour; mesothorax and scutellum shining, base of metathorax dull; legs piceous, with rather dilute brown tarsi; hind tibia and basitarsus with much brilliantly shining silvery hair; abdomen piceous, hind margins of segments dorsally narrowly pallid; last three segments granular, with strong piliferous punctures.

*Hab.* Karachi, N.W. India (*E. Comber*; one is numbered 39). British Museum.

Known from the other Asiatic species by its very small size, punctured apical part of abdomen, dark mandibles, &c. The first r. n. meets the first t.-c., whereas in *A. picitarsis*, *A. rufogastra*, &c. it goes considerably beyond it.

*Tetralonia leucopoda*, sp. n.

♂.—Length about 10½ mm.; antennæ 9½, reaching about to fourth abdominal segment.

Black, with the pubescence pure white except as follows: pale fulvous tinted on occiput, strongly fulvous on thorax above, fawn-colour on sixth (except extreme sides) and last abdominal segments, ferruginous on inner side of anterior tarsi, dark fuscous on inner side of middle and hind pair; head broad; eyes pale green; clypeus and large spot at base of mandibles light lemon-yellow, the yellow of clypeus rectangularly notched on each side; labrum yellowish white, with much white hair; clypeus closely but shallowly punctured; scape very short, black; flagellum long and thick, bright ferruginous, the apical part strongly dusky above; mesothorax closely but not deeply punctured; tegulæ light ferruginous. Wings tinged with brown, nervures and stigma dark ferruginous; legs with much white hair. Abdomen finely punctured, with the hind margins of the segments obscure reddish; fifth segment densely covered with appressed white tomentum, fourth with same, except margin (broadly in middle, but gradually narrowing, the tomentum reaching margin at sides), third like fourth, except that the bare area is so broad in middle as to reach halfway to base, second with the white tomentum confined to extreme base and very broad antero-lateral corners (reaching hind margin at extreme sides); first segment with the usual long hair; a sharp black tooth at each side of apical segment; apical plate dark ferruginous, broad, squarely truncate, not notched subapically; last ventral segment with a concave shining basin. Tarsi ferruginous at apex.

*Hab.* Nasik, N.W. India (*E. Comber*). British Museum.

Among the Indian species this may be compared with *T. phryne* (Nurse), which has the antennæ as long as body, the abdominal bands on second and third segments only "somewhat narrowed in the middle," and the hair on the legs differently coloured. It may also be compared with *T. testaceitarsis*, Cam., but that has rufo-testaceous tarsi, and I infer that the antennæ are black.

*Tetraloniella aliena*, sp. n.

♂.—Length 8 mm. or a little more; antennæ about $7\frac{2}{3}$ mm.

Black, with pale pubescence, very pale ochreous on thorax above, white on face, pleura, cheeks, and legs; abdomen very dark reddish, with dense greyish-white tomentum covering the fifth segment, leaving a narrow apical margin on fourth, leaving a broader margin (about apical third in middle) on third, and on second reduced to base and anterior lateral corners (reaching hind margin at sides); head broad; eyes pale greenish ochreous; clypeus (which is densely and rather strongly punctured), large spot at base of mandibles, and labrum, all lemon-yellow; mandibles (except for the spot) dark, faintly reddish toward apex; maxillary blade obtuse, not much elongated; maxillary palpi small and short, five-jointed, the third joint longest, nearly as long as fourth and fifth together, these subequal; scape short, black; flagellum entirely bright ferruginous; mesothorax densely punctured; tegulæ pale testaceous, very hairy. Wings hyaline, faintly dusky, nervures and stigma testaceous; first r. n. joining second s.m. at about the beginning of its last third; third s.m. narrowed about half above; b. n. falling a little short of t.-m.; small joints of tarsi ferruginous; hair on inner side of tarsi pale orange-fulvous; abdomen minutely granular; apical plate hairy, not notched subapically; hair of apical segments very pale fawn-colour.

*Hab.* Nasik, N.W. India, 2 ♂ (*E. Comber*). British Museum.

Distinguished from *Tetralonia erythrocera*, Cam., by the longer antennæ and testaceous nervures; from *T. cassandra* (Nurse) by the basal instead of apical abdominal bands and the entirely red flagellum; from *T. punctata*, Cam., by the dark mandibles, tegulæ not yellow, and hair of abdomen not fulvous. This is evidently congeneric with *T. brevipennis* and *T. punctata*, which Cameron describes as having four-jointed maxillary palpi. Cameron's figure of the palpi of

*T. brevipennis* appears to indicate that he did not count the basal joint. I place these insects in Ashmead's genus *Tetraloniella* (type *T. graja*, Eversm.), although they do not wholly agree in the venation. If we allow a moderate latitude in our definition of *Tetraloniella*, it cannot very well be separated from the American genus *Xenoglossodes*. The genus *Xenoglossodes* was described by Ashmead (1899) in the same paper as *Tetraloniella*, but on a later page, so *Tetraloniella* must be given priority. Before sinking *Xenoglossodes*, however, it will be necessary to carefully compare *T. graja*, a species I do not possess.

I have regarded *Melissodes* and its immediate allies in America as of southern or neotropical derivation. It is now evident that *Xenoglossodes* represents a northern or holarctic type, from which *Melissodes* and *Xenoglossa* have been derived in America.

*Ceratina* (*Ceratinidia*) *eburneopicta*, sp. n.

♀.—Length 6½–7 mm.

Like *C. morawitzii*, Sickm., but all the markings ivory colour instead of bright yellow; wings clear hyaline. Distinguished at once from *C. hieroglyphica*, Sm., by the small size and the very densely punctured sides of mesothorax in front.

*Hab.* N.W. India (*Comber*), British Museum. Type from Salsette; another from Khandala.

Perhaps only a local race of *C. morawitzii*.

*Ceratina sexmaculata*, var. *purpurascens*, var. nov.

♂.—Deep blue-green, the head, thorax, and abdomen strongly clouded or suffused with purple, especially the front, vertex, and mesothorax. Seen without a lens, the insect appears deep purple-blue, and looks just like *Chrysis cessata*, Buyss., except that the colour is hardly so bright as in the *Chrysis*.

*Hab.* Takao, Formosa, Sept. 20 and 29, 1907 (*Sauter*). Berlin Museum.

*Ceratina binghami*, Ckll.

Nasik, N.W. India (*Comber*). British Museum.

*Ceratina comberi*, sp. n.

♀.—Length a little over 6 mm.

Like *C. binghami*, but smaller, golden green, strongly

suffused with brassy on head, thorax, and basal half of abdomen. Wings clear, stigma ferruginous, nervures testaceous; second s.m. narrowed almost to a point above, and receiving first r. n. not much beyond the middle; last dorsal segment rugose, light bluish green, not keeled; large ochreous mark on clypeus without prominent lateral lobes; labrum and mandibles entirely black; tubercles ivory-colour.

*Hab.* Karachi, N.W. India (*Comber*). British Museum.

Perhaps only a variety of *C. binghami*; Bingham says: "The specimens from the Punjab and Western India have a golden-bronzy tint," referring, I suppose, to *comberi*.

*Apis indica peroni*, Latr.

Tainan, Anping, Formosa, July 13, 1906 (*A. E. Wileman*). British Museum.

*Halictus propinquus*, Smith.

Nasik and Karachi (*Comber*). British Museum.

Closely related to *H. tumulorum*. The tibiæ and tarsi in the female are ferruginous rather than yellow.

*Nomia parcella*, Ckll.

A female from Karachi (*Comber*) is so like an *Halictus* that I had it mixed with that genus. It is like the male, but has a very broad face with thin greyish-white hair; antennæ black, the thick flagellum very obscure reddish beneath; apical half of mandibles dark reddish; front with well-separated punctures and irregular striæ; area of metathorax with irregular rugæ. Legs dark brown, with glittering hairs; knees and small joints of tarsi ferruginous. Apical margins of first two abdominal segments broadly ferruginous. The last-mentioned character readily separates it from the similar small *Halicti* of the same region. From all the other *Nomiæ* of the region, *parcella* is known by the small size, ordinary tegulæ, and hind legs of male not noticeably modified.

*Nomia pereziana*, n. n.

*Nomia gracilipes*, Pérez, Bull. Sci. France et Belgique, xli. 1907, p. 491. Persian Gulf. (Not of Smith.)

Allied to *N. parca*, Kohl, but male tarsi longer.

*Black* Halicti *of India.*

A number of years ago, Col. C. T. Bingham gave me a

graphic account of his troubles with Indian *Halicti*, and after working over a series collected by Mr. Comber I can fully appreciate the difficulty of the subject. Not only are the species very numerous and often closely allied, but the existing descriptions are often hard to interpret. I can only hope that none of the names now proposed as new are synonyms, but in spite of much labour in comparing descriptions and tabulating characters, I fear there remain some probabilities of error. Fortunately the types are all in the British Museum, where they can always be examined by students. The following table separates the species described :—

| | | |
|---|---|---|
| | Mesothorax shining, with sparse punctures on disc | 1. |
| | Mesothorax dull, minutely rugose or punctured | 3. |
| 1. | Labrum ferruginous; flagellum ferruginous beneath (male) | *speculithorax*, Ckll. |
| | Labrum black | 2. |
| 2. | Second abdominal segment without a band of dense tomentum; very small species, with ferruginous tarsi (male) | *debilinervis*, Ckll. |
| | Second abdominal segment with a dense band of tomentum at base | *salsettensis*, Ckll. |
| 3. | Ocelli small and close together, far from eyes. (Ceylon.) | *kalutarœ*, Ckll. |
| | Ocelli normal | 4. |
| 4. | Area of metathorax dull, with widely separated prominent ridges. (Ceylon.) | *sigiriellus*, Ckll. |
| | Area of metathorax shining, with closer or less regular sculpture | 5. |
| 5. | Area of metathorax with only the basal half or a little more sculptured. (Ceylon.) | *semisculptus*, Ckll. |
| | Area of metathorax sculptured all over | 6. |
| 6. | Smaller; mesothorax densely punctured all over | *nasicensis*, Ckll. |
| | Larger; mesothorax less densely punctured on disc | *perhumilis*, Ckll. |

### *Halictus speculithorax*, sp. n.

♂.—Length about or nearly 7 mm.

Black, with the small joints of the tarsi pale ferruginous; pubescence throughout white; head broader than long, clypeus hardly produced; labrum and narrow apical margin of clypeus pale ferruginous; mandibles ferruginous, except at base; front dull, vertex shining; face and cheeks with much white hair; antennæ long; scape black, flagellum strongly infuscated above, beneath pale ferruginous, with the last two joints rather dusky; mesothorax shining, the disc smooth, with very sparse and small punctures, all the margins rather narrowly but densely bordered with pure white hair;

scutellum shining, with sparse minute punctures; post-scutellum with dense white hair; area of metathorax semilunar, large, shining, with coarse irregular ridges, which are scarcely oblique; truncation of metathorax small, its upper end with two tufts of white hair; tegulæ testaceous-hyaline. Wings clear hyaline, beautifully iridescent; nervures and stigma red-brown, outer nervures of submarginal and discoidal cells moderately weakened; second s.m. nearly square; first r. n. meeting second t.-c.; third s.m. not greatly wider than second. Legs with white hair; hind knees and apices of anterior tibiæ reddish; hind knee-plate well developed, elongate. Abdomen moderately elongate, parallel-sided, without evident constrictions; surface dullish, without evident punctures, hind margins of segments reddened; first segment with scattered hair as usual, and on each side a large triangular patch of denser white hair; second and third segments with broad dense basal bands of white tomentum; fourth and fifth with rather narrow and thin, but conspicuous, subapical white hair-bands; apical plate broad, brilliantly shining.

*Hab.* Hyderabad, N.W. India (*E. Comber*).

The disc of the mesothorax is not at all microscopically tessellate between the punctures, as it is in *H. perhumilis*, *H. nasicensis*, *H. salsettensis*, *H. semisculptus*, &c.

*Halictus debilinervis*, sp. n.

♂.—Length about or hardly 5 mm.

Black, with rather scanty white hair, the abdomen with scattered hairs, but no hair-bands or patches; knees narrowly reddish; all the tarsi pale testaceous; head quite large, eyes converging below; mandibles with the apical two-thirds ferruginous; labrum black; apex of clypeus obscurely brownish; antennæ long, flagellum dusky reddish beneath; front dullish, granular, strongly contrasting with the smooth and shining mesothorax and scutellum, which have rather numerous very minute punctures; thorax with thin white hair, not forming a border to mesothorax; area of metathorax large, with feeble irregular longitudinal rugæ; posterior truncation with lateral margins rounded, not defined by a distinct edge; tubercles with narrow brown margins; tegulæ hyaline testaceous. Wings quite clear, with light sepia stigma and nervures, stigma with margins darker than disc; third t.-c and second r. n. evanescent; second s.m. subtriangular, narrowed one-half above; first

r. n. meeting second t.-c.; abdomen rather short, shining, not evidently punctured, hind margins of segments reddish.

*Hab.* Karachi, N.W. India (*E. Comber*).

Disc of mesothorax not microscopically tessellate between the punctures.

*Halictus salsettensis,* sp. n.

♀.—Length about 8 mm.

Black, rather robust, with white pubescence, that on inner side of tarsi orange-tinted; tarsi ferruginous at apex; head broad; clypeus not much produced, its surface shining, with strong punctures and irregular longitudinal grooves; supraclypeal area with weak punctures; front dull, granular; mesothorax and scutellum shining, the disc of the former with scattered punctures of unequal sizes, that of the latter almost impunctate; postscutellum covered with dull white tomentum; area of metathorax smooth and shining, with only vestiges of rather oblique ridges; posterior truncation rather narrow, distinctly margined at sides; tegulæ rufo-testaceous. Wings hyaline, very faintly brownish; stigma and nervures dull reddish; outer nervures weakened; second s.m. subquadrate; first r. n. joining second t.-c.; third t.-c. with a single curve; hind spur with three stout spines and a nodule; abdomen shining, without evident punctures; sides of first segment with rather small sub-triangular patches, in addition to the usual erect hair; second and third segments with broad basal bands of white tomentum, third and fourth with narrower subapical bands of white hair; sides of apical segment with fuscous hair, but the rima pallid. Second abdominal segment microscopically transversely lineolate and finely punctured.

♂.—Similar to the female in all but the usual sexual characters; smaller and more slender; small joints of tarsi brown; clypeus produced, entirely black; flagellum entirely dark, at most faintly brownish beneath; first r. n. entering basal corner of third s.m.

*Hab.* N.W. India (*E. Comber*). Type from Salsette; another female from Nasik. Male from Karachi.

This may be compared with *H. tristis* in the Indian fauna; in the European it reminds one of *H. morbillosus* and its allies.

*Halictus kalutaræ,* sp. n.

♀.—Length about 6½ mm.

Robust, black, the pubescence slightly ochreous, greyish

on pleura, fuscous on scutellum, thin and scanty on head and thorax, except on postscutellum, where it is dense; antennæ dark, flagellum reddened at apex; head large, *peculiar for the strongly elevated vertex and occiput, with the small ocelli close together and remote from the eyes*; a very fine raised line runs from the middle ocellus to the middle of the supraclypeal area; clypeus rugose; supraclypeal area dull, finely granular; front convex, very finely granular; sides of face and vertex more shining, the latter not evidently punctate; *cheeks remarkably small, with a strong keel on upper part just behind eyes*; prothorax flattened and angled at sides in front of tubercles; mesothorax dull, finely rugose, but much more coarsely sculptured than front; scutellum dull, rugose along hind margin; area of metathorax large, defined by absence of hair, entirely dull, with widely separated fine raised lines, more or less, but very irregularly, joined by transverse ones; posterior truncation large, hairy all over, well defined above and at sides, the upper lateral angles right angles; pleura with fine ridges giving a striate effect; tegulæ dark rufous with a large piceous spot. Wings hyaline, faintly dusky, stigma piceous, nervures browner; second s.m. as broad as high, receiving first r. n. near apex; third s.m. not greatly broader than second (no broader above). Legs dark, including tarsi, their hair very pale ochreous, short and fuscous on outer side of middle and hind tibiæ; hind tibiæ broad; hind spur with six long spines, close together. Abdomen broad, very finely punctured, hind margins of the segments broadly impunctate, but not discoloured; basal declivity of first segment with much pale ochreous hair; dense basal bands on second and third segments, that on second interrupted in middle; fourth segment hairy at extreme base; venter with long hair.

*Hab.* Kalutara, Ceylon, March 1910 (*E. Comber*).

A peculiar species.

*Halictus sigiriellus*, sp. n.

♀.—Length about or hardly 6 mm.

Robust, black, with pale slightly yellowish hair: head and thorax dull and finely roughened, abdomen shining; head broad, clypeus rugose, front finely granular; vertex and ocelli normal; flagellum faintly reddish apically; cheeks rather small but normal, with no keel on upper part; mesothorax and scutellum rough, the latter evidently finely reticulate; postscutellum and hind margin of mesothorax covered with pale tomentum; the thin hair of scutellum

pale, but brownish tinted ; metathorax formed as in *H. kalutaræ*, with the same peculiar basal area; upper side of prothorax laterally densely hairy; tegulæ hyaline testaceous. Wings dusky hyaline, stigma and nervures testaceous; second s.m. narrow; first r. n. joining second t.-c.; third t.-c. with a single very slight curve. Legs with pale hair, including outer side of tibiæ; hind spur with four long spines. Abdomen broad, first segment smooth and shining, the others appearing minutely granular; second and third segments with dense basal bands at sides, rapidly narrowing to a point mesad; venter with long hair.

*Hab.* Sigiri, Ceylon, March 1910 (*E. Comber*).

Evidently related to *H. kalutaræ*, but smaller, with normally-formed head.

*Halictus semisculptus*, sp. n.

♀.—Length about 8 mm.

Robust, black, with very pale ochreous pubescence ; head broad; clypeus shining, longitudinally grooved, with punctures in rows ; supraclypeal area convex, dullish, hardly sculptured ; front dull, minutely granular ; vertex shining ; cheeks normal, broad, hairy; antennæ black, flagellum faintly brownish at apex ; mesothorax and scutellum granular-punctate, but moderately shining ; postscutellum (but not hind border of mesothorax) covered with pale tomentum; basal area of metathorax large, shiny, rather more than the basal half covered with irregular wrinkles, tending to form a network ; posterior truncation well-defined, the upper lateral angles greater than right angles, while from them proceeds a ridge along each side of metathorax, running a little upwards ; tegulæ reddish testaceous. Wings hyaline ; nervures and stigma dull testaceous ; third t.-c. and second r. n much weakened ; second s.m. broad, first r. n. reaching extreme basal corner of third s.m. ; hair on inner side of tarsi bright ferruginous ; hind spur with strong spines ; first abdominal segment smooth and shining, with scattered extremely minute punctures ; the other segments shining, but surface appearing more granular; second and third segments with rather thin basal bands of greyish tomentum, continuous right across ; fifth segment dark reddish.

*Hab.* Kalutara, Ceylon, March 1910 (*E. Comber*).

Closely resembles some of the species inhabiting the north-eastern United States, especially *H. arcuatus parisus*, Lovell.

*Halictus nasicensis*, sp. n.

♀.—Length about 6 mm.

Black, with rather dull white pubescence; face and cheeks rather thinly pilose all over; clypeus very small, shining, striate or grooved; front dull and minutely granular; vertex shining; flagellum ferruginous beneath apically; mesothorax dull, finely and closely punctured; scutellum shining, finely punctured; postscutellum with white tomentum; area of metathorax poorly defined, with a fine raised reticulation, failing apically; posterior truncation shining, well-defined, with sharp edges, the upper lateral angles very obtuse; tegulæ rufo-testaceous, fuscous basally. Wings dusky hyaline, stigma and nervures dull testaceous; second s.m. broad, receiving first r. n. at its apical corner; third t.-c. and second r. n. greatly weakened. Hair of legs white, shining on hind tibiæ, pale yellowish on inner side of tarsi. First abdominal segment very smooth and shining, the others more granular; continuous basal bands of white tomentum on second to fourth segments; hair at apex glittering, along sides of rima faintly yellowish; hind spur with large spines. Second abdominal segment with fine punctures, each bearing two little bristles.

*Hab.* Nasik, N.W. India (*E. Comber*).

*Halictus perhumilis*, sp. n.

♀.—Length about 7 mm.

Very close to *H. nasicensis*, but larger, eyes more emarginate, mesothorax less densely punctured; area of metathorax shining, with strong ridges reaching the posterior margin; otherwise practically the same.

*Hab.* Karachi, N.W. India, two specimens (*E. Comber*).

The following characters are seen with the compound microscope: front densely punctate, the punctures more or less in grooves, but the sculpture obscured by short plumose hairs; disc of mesothorax tessellate, with strong punctures, about as far apart as the diameter of one; second abdominal segment with very minute well-separated punctures, mostly bearing a pair of little bristles. This species may be compared with *H. lineolatus*. In Frey-Gessner's table of Swiss species it runs straight to *H. quadrisignatus*, Schk.

*Halictus cameronellus*, n. n.

*Halictus himalayensis*, Cameron, Entomologist, 1904, p. 210 (not Bingham, 1898).

*Halictus strandiellus*, n. n.

*Halictus ceylonicus*, Strand, Berl. ent. Zeits. 1909, p. 187 (not Cameron, 1902).

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XX.—*On some Fossil Mollusca &c. from Southern Nigeria collected by Mr. John Parkinson, M.A.* By R. Bullen Newton, F.G.S. *With an Appendix*, by A. Smith Woodward, LL.D. &c.

(Published by permission of the Trustees of the British Museum.)

[Plate VI.]

(A) Cainozoic Marine Mollusca and Fish-remains from the Bitumen-bearing Deposits of Southern Nigeria.
(B) A Cretaceous Pelecypod from Southern Nigeria.
(C) An Orbitoidal Limestone from Southern Nigeria.

(A) *Cainozoic Marine Mollusca and Fish-remains from the Bitumen-bearing Deposits of Southern Nigeria.* (Pl. VI. figs. 1–16.)

About two years ago Mr. John Parkinson, M.A., during certain survey work in Southern Nigeria under the auspices of the British Colonial Petroleum Company, Limited *, collected some remains of marine Mollusca, accompanied by a Teleostean fish-scale and a Selachian tooth (*Lamna*) from a sandy deposit heavily impregnated with oil which he found in the province of Lagos (6° 38′ 30″ N. lat., and 4° 37′ 00″ E. long.), about 33 miles from the sea "as the crow flies."

* The specimens described in this paper have been generously presented to the Geological Department of the British Museum (Natural History) by this Company.

According to information received from Mr. Parkinson, these fossiliferous beds extend for over 50 miles in a direction parallel to the coast. In his description of the geology of this region (Quart. Journ. Geol. Soc. 1907, vol. lxiii. pp. 309 & 312) Mr. Parkinson included the beds in the "Ijebu Series," which he placed between some younger deposits without fossils called the "Benin Sands" and the "Lignite Series" with obscure plant-remains, which was regarded as of older age. Above the "Benin Sands" was placed the "Alluvium."

Some imperfect impressions of shells obtained from bore-holes and a section in the Ijebu District were referred to in the same paper as having been examined by Mr. Henry Woods, who recognized *Cardium* (?), *Arca* (?), *Astarte* (?), *Gari* (*Psammobia*?), *Meretrix* (?), and a *Natica*. These forms were not figured, nor was any opinion offered as to their particular facies or their geological horizon *.

The matrix accompanying one of the specimens under description is a drab-coloured, argillaceous, compact sand, which is easily severed with a knife as well as readily pulverizing with friction; it has entirely escaped any oily impregnation, and therefore exhibits the natural character of the deposit. The remaining shells are associated with apparently the same sandy formation, but of a very dark blackish-brown colour, caused by the saturations of petroleum; many of the specimens are without any testaceous layer, being simply casts with jet-black lustrous surfaces, whilst others, possessing thicker shell-structures, present a snow-white appearance, besides being frequently decorticated and of shred-like character, after the manner of asbestos.

The Mollusca represented consist mainly of Pelecypoda, with some indeterminable Gastropoda and one Scaphopod. The whole of the forms appear to be of fairly shallow-water habit and accustomed to sandy areas. As the border region of the province of Lagos consists of an extensive lagoon

* Some small fossils from these bore-holes, including the *Meretrix* (?) examined by Mr. Woods, have been forwarded to the writer by Mr. Parkinson. They consist of Pelecypod casts, a fragmentary *Dentalium* (?), &c., and some obscure fish-fragments; and, although indeterminable, it is certain that they are in no way connected with the shell fauna found in the bitumen-bearing beds, appearing to be much older—so much so that, with more material at command, they could possibly be compared with an Eocene fauna from the Kamerun district described in recent years by Dr. Paul Oppenheim ('Beiträge zur Geologie von Kamerun—Dr. Ernst Esch Expedition,' 1904, pp. 246–285, pls. vi.–ix.). But among these fossils is an isolated fragmentary Pelecypod valve bearing a Cretaceous facies, which will be presently referred to (see p. 201).

which by several inlets is in communication with the sea, it is considered that the deposits containing the shells would represent an old lagoon area which probably formed a continuation of that already existing. The specimens seem to exhibit a Mediterranean or Atlantic facies, and although it has been necessary to introduce a few new specific names, nearly all show certain phases of modern character. Some of the known species referred to range from Upper Tertiary times in Europe and England, such as the Pliocene, so that it is possible the deposits may belong to either an ancient part of the post-Pliocene period or to even the Pliocene itself; in any case they are not supposed to be of older date than Pliocene. More perfect material is, however, wanted before a truly accurate determination of the horizon is really possible.

The writer wishes to acknowledge valuable assistance in the drawing up of this paper from his colleague at the British Museum (Natural History), Mr. Edgar A. Smith, I.S.O., who is in agreement with him in recognizing the fauna as suggestive of the modern Atlantic or Mediterranean facies.

## Pelecypoda.

### *Pteria* sp. (Pl. VI. fig. 1.)

*Description.*—*Shell* obliquely oblong, compressed, fragile, nacreous, smooth, obsoletely striated; umbo very anterior, nearly marginal; cardinal line short, without terminal extensions, furnished below with an oblique groove directed posteriorly.

*Dimensions* (largest valve).—Length = 17, height = 32 mm.

*Remarks.*—Two examples represent this form, consisting of right valves of different sizes. The smaller shows some obscure radial striations on the surface.

There are no aliform expansions to either specimen, the cardinal line being short and only equal in extent to the length of the shell. The specimens are mere films on the sandy matrix, and although the valves are much compressed the larger one possesses a very slight oblique axial convexity, as well as a rather feeble depression postero-dorsally.

If we regard these remains as very decorticated, and in that manner account for the absence of the usually produced cardinal extremities, then it is possible that they belonged to Lamarck's *Avicula tarentina* (= *Mytilus hirundo*, Linnæus, pars), an Atlantic species, varieties of which also occur in the British and Italian Pliocene beds. The margins are,

however, quite distinct, and they do not appear to have had produced terminals to the cardinal region.

*Arca* cf. *lactea*, Linnæus. (Pl. VI. figs. 2, 3.)

*Arca lactea*, Linnæus, Syst. Naturæ, 1758, ed. x. p. 694; Searles Wood, Mon. Pal. Soc. (Crag Mollusca) 1850, pl. x. fig. 2, p. 77.
*Fossularca lactea*, Sacco, Moll. Terziarii Piemonte &c., 1898, vol. xxvi. pl. iii. figs. 20–23, p. 19.

*Remarks.*—The two examples regarded as being closely allied to the Mediterranean species *lactea* are of very similar dimensions to that form, the length being about one and a half times the height. The sculpture, which also agrees, exhibits a series of fine and closely arranged costæ crossed by equidistant concentric growth-lines. The valves, however, are rather compressed than otherwise, which would be the chief reason for not regarding them as belonging to the true *lactea*. They differ from *Arca nigeriensis*, next described, in their less angulate contour and more median umbones.

*Dimensions* (largest example).—Length = 14, height = 9 mm.

The Linnæan shell has been determined from the Pliocene (Coralline and Red Crags) beds of England, whilst Sacco has recognized it under *Fossularca* of Cossmann, and considers it as occurring in Italy in rocks ranging from Miocene (Helvetian) to Pliocene (Astian) times.

*Arca nigeriensis*, sp. n. (Pl. VI. figs. 4, 5.)

*Description.*—*Shell* small, inequilateral, oblong, length nearly twice that of the height; anterior margin rounded, posterior truncated, slightly excavated; striæ equal, numerous and fine (about 60), crossed by concentric growth-lines; valves depressed ventrally.

*Dimensions* (largest specimen).—Length = 17, height = 9 mm.

*Remarks.*—This form is distinct from *Arca tetragona* of Poli, found in the Mediterranean and in the Pliocene deposits of Europe, by reason of its more equal striations and the less elevated umbonal region. The radial costæ ornamenting the posterior surface of *A. tetragona* are much stronger and fewer than those of the present form; both species, however, are similar in possessing a horizontal hinge-line which is parallel with the ventral margin.

*Cardium* cf. *decorticatum*, S. V. Wood. (Pl. VI. figs. 6, 7.)

*Cardium decorticatum*, S. V. Wood, Mon. Pal. Soc. (Crag Mollusca) 1853, pl. xiv. fig. 1 *d*, p. 159.

*Description.* — *Shell* cordately ovate, slightly oblique,

inequilateral; costæ fine, numerous (about 36), separated by narrow grooves, convex, smooth.

*Dimensions* (largest example).—Length = 20, height = 20 mm.

*Remarks.*—There are several examples of this form of *Cardium*, which appears to be one of the prevailing shells of these deposits. The costæ are considerably worn, especially near the ventral margin, but they are quite as numerous and fine as in young examples of *decorticatum* from the English Crag contained in the Searles Wood Collection at the British Museum. Like them, also, the costæ become eroded and are frequently divided by a fine central groove. The specimens may represent the young forms of this species, in which the ribs are continuous over the surface of the valve, whereas adult examples recorded from England are without costæ on the posterior side.

They may be said also to show some resemblance to young examples of *Cardium muricatum*, an Atlantic species (West Indies) of Linnæus (Syst. Naturæ, 1758, ed. x. p. 679), as determined in the Zoological Department of the British Museum, especially in the number and general formation of the costæ.

### (?) *Gastrana* sp. (Pl. VI. figs. 8, 9) and associated Fish-scale (Pl. VI. fig. 16).

*Description.*—The collection contains a fragmentary right valve of what is doubtfully referred to the genus *Gastrana*. It is of oval-oblong shape and covered with prominent, equidistant, concentric laminations of slightly infundibuliform character, separated by well impressed sulcations; no radial ornamentation is visible.

The umbonal region is moderately elevated, oblique, and anterior; the margins of the front and ventral areas are rounded, the postero-dorsal border is straight and oblique, whilst the posterior surface is more or less truncated.

*Dimensions.*—Height = 18, length = 22 mm.

*Remarks.*—It is in the regular character of the costæ, the truncated posterior side, and the elevated umbonal region, which suggests at first glance a relationship to *Gastrana*, although the concentric sculpture of that genus shows no infundibuliform character as in the present specimen. Without more complete material it is difficult to place such a fragment in its true generic position, and so for present purposes it has been compared with examples of *Gastrana laminosa*, J. de C. Sowerby, from the British Pliocene beds, a form closely allied to the recent *fragilis* of Linnæus.

This specimen is in a matrix particularly free from oily impregnations, thus exhibiting its original drabbish colour. Embedded in the same material is a fish-scale (see Pl. VI. fig. 16) which Dr. A. S. Woodward informs me is a scale of the lateral line of a fish; Mr. Boulenger, who has also examined the specimen, regards it as undoubtedly possessing Teleostean characters.

The surface is mostly covered with a lustrous chitinous-looking layer of brownish colour, besides being furnished with a closely arranged set of delicate concentric striations; in the centre is a single rib-like body answering to the "lateral line."

The margins are not quite complete, so that the present measurements of 8 by 5 mm. might originally have been slightly increased upon.

(?) *Tellina* sp. (Pl. VI. fig. 10.)

*Remarks.*—This Pelecypod consists of a transversely oval compressed valve, with an almost median umbo which is slightly elevated above the dorsal line. It is badly preserved, although the actual contour-lines are fairly well seen; some obscure ornamentation appears to be purely concentric and representing growth-lines only.

*Dimensions.*—Height = 20, length = 35 mm.

(?) *Lutraria* sp. (Pl. VI. fig. 11.)

*Remarks.*—A fragmentary specimen is provisionally determined under the above name. It appears to be chiefly the anterior portion of a transversely oblong valve with a subangulate end, a well-curved ventral margin, and a dorsal border which may be more or less parallel with that of the ventral region. The umbo appears to be vertical and very little raised, not projecting beyond the dorsal margin, and is situated about 20 mm. distant from the anterior border. A strikingly oblique groove runs from the right-hand side of the umbo, but is not continuous to the ventral margin; the general surface is furnished with obscure concentric striations.

This fragment belongs to a shell of shallow and compressed form, and is doubtfully placed with *Lutraria*, although there is no groove in that genus which would correspond with what is seen in the present specimen. Without further material, however, a closer determination is impossible.

The height of the specimen is 23 mm.

The shape of the anterior end, its compressed character, and the more or less vertical umbo would suggest a relationship to probably a young form of *Lutraria elliptica*, Lamarck, a species occurring in the Pliocene beds of Europe and England, and which, moreover, exists in the Mediterranean.

*Cuspidaria* cf. *rostrata*, Spengler, sp.
(Pl. VI. fig. 12.)

*Mya rostrata*, Spengler, Skrivt. naturhist. Selskab. Kjöbenhavn, 1793, vol. iii. pl. ii. fig. 16, p. 42.
*Cuspidaria rostrata*, Sacco, Moll. Terz. Piemonte &c., 1901, vol. xxix. pl. xxvi. figs. 35–37, p. 124.

*Remarks.*—There is only a single specimen to represent this form of Pelecypod, which consists of a right valve of subtrigonal contour, with a marked anterior globosity and a narrowly rostriform extension postero-ventrally, the sculpture consisting of delicate and irregular striations on a concentric basis, without any evidence of radial ornamentation. The basal border is strongly arcuated in front, becoming afterwards widely sinuated as part of the produced posterior extension.

*Dimensions.*—Height = 9, length = 15 mm.

With only one example it is difficult to say whether it should be placed with Olivi's *cuspidata* or Spengler's *rostrata*, both species being regarded by some authors as synonymous and having a similar range in time, viz. from the Upper Tertiaries of Europe to the recent period.

*Barnea lagosiensis*, sp. n. (Pl. VI. fig. 13.)

*Description.* — *Shell* subcylindrical, thin, inequilateral, umbo at one-third distance of entire length ; anterior end rounded, closed, narrow; posterior region extended, acuminate; postero-umbonal margin elongately concave; antero-dorsal margin reflected ; ornamented with equidistant radial costæ (about 25) of considerable obliquity, occupying about three-quarters of the surface and crossed by nearly equidistant growth-lines which at the junctions show obscure thickenings or tubercles; posterior surface furnished with lines of growth only.

*Dimensions* (largest specimen).—Height = 15, length = 46 mm.

*Remarks.*—This form is apparently closely related to the recent *Pholas candidus* of Linnæus, the type of Risso's genus

*Barnea*, which includes shells anteriorly closed and possessing a single dorsal accessory plate or umbonal shield. It differs, however, from that species in the umbo being rather further removed from the anterior margin and in its more regularly spaced costæ, the last one of which forms a prominent oblique demarcation between the anterior and posterior surfaces; the posterior region is likewise relatively larger than in the recent shell. The specimens have none of the delicate shell-structure remaining, although as casts all the details of sculpture are well preserved. There is, moreover, no indication of the umbonal shield.

Examples of this shell are of frequent occurrence in these deposits.

## Scaphopoda.

### *Dentalium entale*, Linnæus. (Pl. VI. fig. 14.)

*Dentalium entalis*, Linnæus, Syst. Naturæ, 1758, ed. x. p. 785; Forbes & Hanley, Hist. British Mollusca, 1849, vol. ii. pl. lvii. fig. 11, p. 449; Hœrnes, Foss. Moll. Tert. Beck. Wien, Abhandl. k.-k. Geol. Reichs. 1856, vol. iii. pl. l. fig. 38, p. 658.

*Remarks.* — This specimen is fragmentary and badly preserved, yet showing a fairly complete axial contour. It is a rounded form, with a gentle curvature, and apparently tubular throughout. There are no indications of longitudinal striations, the form appearing to be quite smooth, with the exception of concentric growth-lines, which are most apparent at the anterior or widest end. It is without fissure or labial projection at the posterior end.

*Dimensions.*—Length 42, diameter (anterior) 6 mm.

The fossil appears to differ in none of its details from the living species of the Mediterranean, and it curiously corresponds in size and curvature with the figure of Forbes and Hanley of a specimen found off the British coasts. The species appears to have existed from Miocene times upwards, having been recorded from the Upper Tertiaries of Europe.

## Gastropoda.

There are fragmentary remains of Gastropoda distributed through these sandy constituted deposits, but they do not lend themselves to determination, and nothing further can be said of them; but they include a possible *Turritella* and some fusoid shells (see Pl. VI. fig. 15).

## (B) *A Cretaceous Pelecypod from Southern Nigeria.* (Pl. VI. figs. 18, 19, 20.)

Among some small indeterminable fossils obtained by Mr. Parkinson from certain bore-holes in the Lagos province of Southern Nigeria is a fragmentary Pelecypod valve which is of considerable importance, as it implies the presence of Cretaceous rocks in that area. The specimen referred to belongs to the genus *Veniella* of Stoliczka, better known among African Cretaceous fossils as *Roudaireia* of Munier-Chalmas, the synonymy of which has been recently reviewed by the present writer* in an account of some Cretaceous shells from Zululand.

*Veniella auressensis* (?), Munier-Chalmas, sp.

*Trigonia auressensis*, Coquand, Géol. Pal. Constantine, 1862, pl. xii. figs. 10, 11, p. 203.
*Roudairia drui*, Munier-Chalmas, Mission M. le Com. Roudaire Chotts Tunisiens, 1881, pls. iv., v. pp. 74–77.
*Roudaireia auressensis*, Peron, Desc. Invert. Foss. Crétacés Tunisie, Explor. Scient. Tunisie, 1893, pl. xxix. figs. 10–12, p. 299.
*Roudairia drui*, Quaas, Fauna obersten Kreidebild. libyschen Wüste, Palæontographica, 1902, vol. xxx. part 2, pl. xxiv. figs. 20–22, p. 221.

The specimen is represented by a small umbonal fragment of a left valve, showing the remains of a wide and robust hinge-plate, but without the dentition being preserved, over which curves a subacute umbo with its nucleus touching the upper margin of the hinge-plate.

The trigonal character of this genus is well expressed in the specimen, which, moreover, exhibits the prominent oblique carina dividing the anterior from the posterior regions.

Thick horizontal ridges, curving upwards at their anterior ends, ornament the shell in front, which are widely separated during the progress of development, finer striations occurring within at the earlier stages of growth, otherwise the furrows are smooth; a well-defined lunulate area is also present.

The posterior side is abrupt and furnished with a nearly median ridge, whilst the surface is closely and obliquely ornamented with lines of microscopical size; the ventral margin is broken, so that the original height of the specimen is unknown, although it probably represents an example which might have been 30 mm.

*Dimensions* (umbonal fragment).—Length = 7, height = 5 mm.

* Trans. Royal Soc. South Africa, 1909, vol. i. pp. 67–69.

It is possible that this fragment may belong to *Roudairia drui* of Munier-Chalmas*, the type of that genus and the equivalent of Coquand's *auressensis*, a well-known shell ranging from Senonian to Danian times, as found in various African localities, especially in Tunis and Egypt. So far as can be seen, the specimen appears to differ from *Veniella forbesiana* of Stoliczka†, an allied species of Lower Senonian age from India, Zululand, &c., in being narrower and more delicately constructed in the umbonal region and in possessing the horizontal character of the ridges; the specimen also would appear to have been more compressed, especially near the carination.

The other related species from India are *Cyprina cristata* and *cordiuis* of Stoliczka, described and figured in the same work.

It is of interest to note that Dr. Solger‡ has determined some bivalves from the "Mongokreide" of the Cameroons as belonging to this genus, with resemblances to *Roudairia auressensis*, Coquand, sp., but without illustrations, which would indicate that the Upper Cretaceous rocks of that area are continued into Southern Nigeria.

For the present, however, it is considered best to refer Mr. Parkinson's fragment to the species *auressensis* with a query, until further material is forthcoming for fuller confirmation as to its true specific relations. In the meantime the specimen is of great geological interest, as its presence indicates the existence of Upper Cretaceous deposits belonging somewhere between the Upper Senonian and the Danian stages of that period. In this late portion of the Cretaceous the species has been recorded from Algeria, Tunis, Tripoli, Egypt (*Ostrea overwegi* beds of the Libyan Desert), Palestine, and Syria§, and a related form from the Cameroons (=Kamerun).

### (C) *An Orbitoidal Limestone from Southern Nigeria.*

Mr. Parkinson's geological specimens from Southern Nigeria include a piece of limestone of yellow-ochreous colour made up entirely of what appears to be one form of

* 'Mission M. le Com. Roudaire Chotts Tunisiens,' 1881, pls. iv. & v. pp. 74–77.

† See R. B. Newton, Trans. Royal Soc. South Africa, 1909, vol. i. p. 67.

‡ "Die Foss. Mongokreide Kamerun," in Dr. Ernst Esch's 'Beiträge zur Geologie von Kamerun,' 1904, p. 230.

§ Blanckenhorn, 'Beiträge zur Geologie Syriens,' 1890, pp. 24, 25, 27.

Orbitoid (associated with an occasional small species of *Operculina*), which, from microscopical examination, may be referred to the genus *Orthophragmina* of Munier-Chalmas as interpreted by Schlumberger.

The foraminiferal group of the Orbitoides has been studied by numerous authors for some years, although the chief systematic work on the subject was that accomplished by Gümbel* in 1868, containing important results obtained from an examination of material collected in the northern Alps of Eocene age, or what was termed "der Kressenberger Nummulitenschichten." He subdivided the genus *Orbitoides* of Orbigny into five subgenera—*Discocyclina*, *Rhipidocyclina*, *Aktinocyclina*, *Asterocyclina*, and *Lepidocyclina*—most of which were founded upon external form or peculiarities of ornamentation.

In 1896 Verbeek and Fennema†, in their 'Geology of Java,' published researches on the *Orbitoides* from the rocks of that country, limiting Gümbel's divisions to two instead of five, viz. *Discocyclina* (embracing *Rhipidocyclina*, *Aktinocyclina*, and *Asterocyclina*) for forms with rectangular chambers in the median plane; and *Lepidocyclina* for species having rounded chambers in the median plane. Such results were based entirely on internal structures, and in this way differed from that of Gümbel. From the horizonal point of view their work was of immense value, because they found that the species of *Discocyclina*, at any rate in the Indian Archipelago, belonged entirely to Eocene and Oligocene rocks, whilst forms of *Lepidocyclina* never occurred in older deposits than Miocene, and apparently became extinct in Pliocene times. The geological views expressed by these authors are now generally acknowledged to apply equally well to the distribution of Orbitoidal organisms in the European formations.

During 1899 the present writer, in conjunction with Mr. Richard Holland‡, wrote an account of some Tertiary Foraminifera from Borneo, with special remarks on the *Orbitoides*, and adopted the views of Verbeek and Fennema in connexion with their studies of those forms.

Coming more directly to the genus we have to consider, it should be mentioned that *Orthophragmina* was a name given to certain foraminiferal bodies by Munier-Chalmas§ which

* Abhandl. math.-phys. Cl. k.-bay. Ak. Wiss. 1868, vol. x. part 2, p. 109.

† 'Descript. Géol. de Java et Madoura,' 1896, 2 vols., text and plates.

‡ Ann. & Mag. Nat. Hist. 1899, ser. 7, vol. iii. pls. ix. & x. pp. 245–264.

§ "Étude du Tithonique, du Crétacé et du Tertiaire du Vicentin," Thèse de Docteur ès Sci. Nat. [Paris] 1891, p. 18.

he recognized in the rocks of Northern Italy (Vicentin), and which were stated to range geologically from the Lower Eocene to Aquitanian *, their maximum size being reached in the latter horizon. This record was, however, unaccompanied by a description, figure, or reference to specific forms, and so failed to have any scientific importance from the nomenclature point of view.

In the same memoir Munier-Chalmas notified that he had previously alluded to this generic name in the Bull. Soc. Géol. France, 1891, sér. 3, vol. xix., but without giving the pagination. A careful perusal of the volume has proved the inaccuracy of such a statement, no mention of *Orthophragmina* being found ; so that it can only be surmised that the author had in preparation a paper upon the subject which apparently never saw publication.

Later on Schlumberger †, who had been studying the structure of *Orbitoides*, commenced to issue a series of papers in which the genus *Orthophragmina* was adopted, with *Orbitoides pratti* as the type, this being the equivalent of *Orbitolites pratti*, Michelin (see references in footnote, 1901, p. 464, and 1903, p. 274), originally described from the supra-Cretaceous beds of the environs of Biarritz, France.

Gümbel ‡ had previously regarded Michelin's *pratti* as synonymous with *Nummulites papyraceus* of Boubée (Bull. Soc. Géol. France, 1832, vol. ii. p. 445), which he placed under the genus *Orbitoides*, as well as recognizing it as the type of his subgenus *Discocyclina*.

Later researches have demonstrated that the structures of these two species are not the same, Schlumberger determining Boubée's *papyraceus* as a true *Orbitoides* and restricted to Upper Cretaceous deposits. Hence it would appear that

* An Aquitanian example was not then mentioned specifically, although said to occur in "les calcaires d'Isola di Malo" (see p. 19 of the Thesis). Later on in the same work (p. 76) this form was referred to as *Orthophragmina* (*Orbitoides*) *elephantina*, a species which was subsequently described and figured by Messrs. Lemoine and R. Douvillé (Mém. Soc. Géol. France, 1904, vol. xii. fasc. 2, Mém. no. 32, pl. ii. figs. 13, 19, p. 13) as a *Lepidocyclina*, and not *Orthophragmina*. The genus *Orthophragmina* is therefore essentially Eocene, being found as high as the Priabonian stage, which is regarded alike as uppermost Eocene or the lowest part of the Oligocene. It does not occur in a later horizon.

† Bull. Soc. Géol. France, 1901, sér. 4, vol. i. pl. vii. pp. 459–467 (Cretaceous) ; *ibid.* 1902, sér. 4, vol. ii. pl. vi. pp. 255–261 (Cretaceous) ; *ibid.* 1903, sér. 4, vol. iii. pls. viii.–xii. pp. 273–289 (Eocene) ; *ibid.* 1904, sér. 4, vol. iv. pls. iii.–vi. pp. 119–135 (Eocene).

‡ *Ibid.* p. 112.

the type of *Discocyclina*, being misinterpreted by Gümbel, subsequent writers have deemed it necessary to introduce the name of *Orthophragmina* in its place.

The following genera recognized by Schlumberger (memoir before quoted, 1901, pp. 463, 464) constitute the Orbitoidal group of the Foraminifera as now understood:—

(1) *Orbitoides*, Orbigny, with rhomboidal equatorial chambers augmented sensibly in height towards the circumference, where they are frequently subdivided; perforations of the septa rather strong.
Type = *Orbitolites media*, Archiac.
*Formation and Localities.* Upper Cretaceous (Dordonien) of France, &c.

(2) *Orthophragmina*, Munier-Chalmas, with equatorial chambers "parallèlipédiques," = square or rectangular.
Type = *Orbitolites pratti*, Michelin.
*Formation and Localities.* Eocene to Oligocene (Priabonian), Biarritz, North Italy, Kressenberg, &c.

(3) *Lepidocyclina*, Gümbel, with rounded or hexagonal equatorial chambers, and with finely perforated septa.
Type = *Nummulites mantelli*, Morton.
*Formation and Localities.* Oligocene (Vicksburg Group), N. America, and Miocene of Europe.

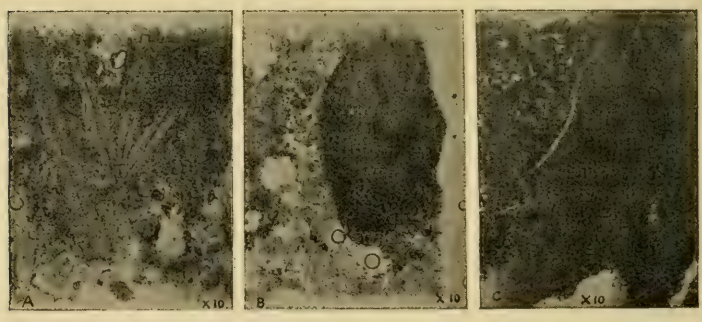
(4) *Myogypsina*, Sacco, with spiral embryo more or less excentric and lanceolate equatorial chambers.
Type = *Nummulites irregularis*, Michelotti.
*Formation and Localities.* Miocene (Aquitanian), Italy, &c.

The main organisms of this limestone and those only that can be seen in a general way without microscopical aid are of abundant occurrence, being frequently closely packed together in layers, and resembling in this manner some rocks from Biarritz and Kressenberg containing *Orthophragmina pratti* (= *papyracea* of Gümbel, non Boubée) of Eocene age.

The specimens also agree in being of nearly the same diameter, probably rather smaller, and also in their excessive thinness—so much so, that horizontal internal views are difficult to obtain.

Some excellent sections have, however, been made by Mr. Richard Hall, the Senior Formatore of the British Museum (Natural History), which exhibit chiefly vertical

views of the organism, although there are fragmentary pieces yielding sufficient of the median plane aspect to show the rectangular nature of the chambers. This rectangular character, as seen on the median plane, permits of a true generic determination in favour of *Orthophragmina*, as opposed to *Lepidocyclina* with rounded or hexagonal chambers, which is of Lower Tertiary age, and ranges from Eocene to Oligocene (Priabonian) times. Judging by the excellent figures of Gümbel and also of Schlumberger, we may regard these specimens as Michelin's *pratti*, which ranges from Lutetian to Priabonian * and is found at Biarritz †, Kressenberg, Italy, &c. For present purposes, therefore, it may be stated that the limestone from Southern Nigeria belongs to the Eocene series, and either to the Lutetian, Bartonian, or Priabonian division of that formation.




A. *Orthophragmina pratti*, from Lagos, showing vertical sections.
B. Ditto, ditto, equatorial section, showing rectangular character of the chambers.
C. Ditto, from Biarritz (for comparison).

*Locality.* Lagos Province of Southern Nigeria, about 14 miles from a spot localized as 6° 38′ 30″ N. lat., and 4° 37′ 00″ E. long., where the bitumen-bearing beds occur with the marine Mollusca.

* Oppenheim, "Die Priabonaschichten und ihre Fauna," Palæontographica, 1900, vol. xlvii. p. 44.

† Prever, "I terreni Nummulitici di Gassino et di Biarritz," Atti R. Accad. Sci. Torino, 1905, vol. xli. pp. 10–12.

## EXPLANATION OF PLATE VI.

*Fig.* 1. *Pteria* sp.
*Figs.* 2, 3. *Arca* cf. *lactea*, Linnæus (fig. 3=structure magnified).
*Figs.* 4, 5. *Arca nigeriensis*, sp. n. (fig. 5=structure magnified).
*Figs.* 6, 7. *Cardium* cf. *decorticatum*, S. V. Wood (fig. 7=structure magnified).
*Figs.* 8, 9. (?) *Gastrana* sp. (fig. 9=structure magnified).
*Fig.* 10. (?) *Tellina* sp.
*Fig.* 11. (?) *Lutraria* sp.
*Fig.* 12. *Cuspidaria* cf. *rostrata*, Spengler. × 2.
*Fig.* 13. *Barnea lagosiensis*, sp. n.
*Fig.* 14. *Dentalium entale*, Linnæus.
*Fig.* 15. [Fusoid shell.]
*Fig.* 16. Scale of Teleostean fish, × 2, with (?) *Gastrana*.
*Fig.* 17. Tooth of Selachian fish (*Lamna*).
*Fig.* 18. *Veniella auressensis* (?), Munier-Chalmas, external view. × 4.
*Fig.* 19. Ditto, ditto, internal view. × 4.
*Fig.* 20. Ditto, ditto, internal view of fragment, with restored outline showing probable size of valve.

[Except where specified the figures are drawn of the natural size.]

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## Appendix.

### *Note on a Fossil Fish from Ekoi Creek, Southern Nigeria.*

By A. Smith Woodward, LL.D., F.R.S.

An incomplete fossil fish (Brit. Mus. no. P. 10128) obtained by Mr. J. C. Cotton from the supposed Cretaceous of Ekoi Creek on the Calabar River, comprises the head and anterior portion of the abdominal region of a Clupeoid or Elopine species. The specimen is exposed in right side view, but the bones and scales are in a much fractured and flaky condition, and cannot easily be interpreted. The head with opercular apparatus is long and narrow, probably about 9 cm. in length and 5 cm. in maximum depth, with a sharply pointed snout; and there is no trace of external ornament on the remains of the jaws, cheek-plates, or operculum. The cleft of the mouth is wide, the quadrate articulation being clearly seen at the hinder end of the mandible, below the postorbital region of the skull. The maxilla is long, stout, and nearly straight, and bears moderately large conical teeth. The orbit must have been very large, and the postorbital part of the cheek is completely covered with plates. The preoperculum is much expanded, and has a large lower limb. The pectoral fin is long and narrow, inserted well

above the lower border of the trunk and just below a smooth enlarged postclavicular scale. Its rays are nearly uniform in stoutness and articulated only quite at their extremities. The scales seem to have been large, thin, smooth, and deeply overlapping.

In general aspect this imperfect fish is very suggestive of *Syllæmus*, a Clupeoid from the Chalk, both of Europe and of North America; but it differs from the known species of the latter genus in the deeper cleft of its mouth, the shape of its mandible, and the relatively larger size of its maxillary teeth.

The specimen was presented to the British Museum (Natural History) by the Director of the Imperial Institute, during 1905.

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## XXI.—*New Species of Heterocera from Costa Rica.*—X.

By W. Schaus, F.Z.S.

*Micrantha mollita*, sp. n.

Palpi brown; frons whitish green; vertex and collar buff, shaded with light brown and with a few dark irrorations on collar; thorax mottled buff and white, darkly irrorated in front; abdomen buff-brown, with paler segmental lines. Fore wings: base roseate buff, shading to grey medially and from vein 2 to inner margin terminally; some dark scales at base of inner margin; an indistinct brownish geminate antemedial line; orbicular and reniform space pale green; a greenish space below orbicular; the costa medially mottled grey and brown; a greyish-brown medial shade, tinged with dull green, expanding below reniform; reniform space followed by a whitish line and by a large brown space to near apex, which is crossed by the fine postmedial outcurved and geminate lunular line, this line being filled in with white on costa; a subterminal line, whitish from costa to vein 5, roseate buff below 5, crossing the brown space near apex, inwardly shaded with green between 7 and 4, and followed by a dark brown spot between 6 and 4; a terminal interrupted black line, inwardly edged with whitish; cilia green. Hind wings fuscous; a terminal black line.

Expanse 22 mm.

*Hab.* Sixola.

*Lithacodia veternosa*, sp. n.

♀. Palpi inwardly buff, outwardly fuscous brown; third joint buff, tinged with fuscous. Fore wings fuscous brown; antemedial buff-brown, heavily edged with black, oblique on costa, inset on subcostal, slightly outcurved below median, and more so below submedian; orbicular a white point edged with black; a medial wavy black line; reniform long, consisting of a brown line on discocellular, inwardly finely edged with white, outwardly broadly edged with white, and surmounted by a buff spot on costa; postmedial from vein 8, fine, black, wavy, followed by a creamy-buff shade and a heavier black line from 8–3; below vein 2 the buff shade is crossed by a fine brown line; a subterminal black shade, heaviest from costa to vein 4, very irregular, and partly shaded outwardly with buff-brown; terminal lunular dark velvety-brown spots between the veins, inwardly edged with pale scales. Hind wings fuscous brown; a terminal lunular fuscous line, edged with whitish scales; whitish streaks on cilia at veins.

Expanse 38 mm.

*Hab.* Sixola, Banana River.

*Lithacodia homopteridia*, sp. n.

♀. Palpi brown, irrorated with buff. Head light reddish brown. Collar and thorax dark brown, the scales tipped with lilacine grey. Abdomen dull grey-brown, with dark dorsal tufts at base. Fore wings dark brown, the shadings and lines almost black; a medial and four outer white points on costa; a basal line on costa; a finely dentate antemedial line, velvety black, geminate, most heavily marked on inner margin; an irregular medial shade, followed by a large spot in cell; a white point at origin of vein 3; postmedial geminate, wavily dentate; a subterminal dark greyish-brown line, faintly lunular, inwardly broadly shaded with fuscous; terminal velvety black lunules, inwardly edged with dark grey-brown, and separated by minute buff points on veins. Hind wings fuscous brown; a whitish-buff spot at anal angle; terminal lunules and points as on fore wings. Underneath lighter fuscous brown, irrorated with lilacine white; a finely lunular postmedial line with whitish streaks on veins; inner margin of fore wings white.

Expanse 32 mm.

*Hab.* Carillo.

*Lithacodia jora*, sp. n.

♂. Palpi dark brown, streaked with buff at tip; frons black, vertex white, shaded with greenish buff; collar dark brown, with a few white scales behind; thorax whitish, with a dark brown spot in front, the patagia greenish, slightly tipped with dark brown; abdomen greenish buff, with dark brown transverse shadings and dorsal tufts. Fore wings light olive-green, darker medially below cell; the costa spotted with fuscous brown, and towards apex with white; the basal spot large, extending into cell; a small spot at base of inner margin; medial spot on costa heavily marked, below it the orbicular, which consists of a fuscous-brown point circled with white, and below cell a curved brownish line to inner margin, preceded below cell by a dark brown point; reniform space large, white, containing a fuscous-brown streak; postmedial remote from cell, incurved close to vein 4 to below reniform, slightly outcurved at vein 2, and heavily marked with white; outer margin fuscous brown, interrupted by an olive-green space between 4 and 6, and with some greenish-brown mottlings above tornus; cilia fuscous grey and brown, with fine white streaks at veins 2, 3, 5, 6, and 7; a white streak on costa near apex. Hind wings silky brownish grey.

Expanse 20 mm.

*Hab.* Juan Vinas.

*Eustrotia obliquilinea*, sp. n.

Palpi outwardly brown, inwardly buff; head and collar light brown; thorax darker brown, the patagia outwardly streaked with white; abdomen brownish grey. Fore wings dark olive-brown, the inner margin and a shade at and beyond cell light olive-brown; an oblique white line from base of costa to submedian vein; a broad, obliquely curved, white antemedial line to submedian fold at subterminal, shaded between fold and vein 4 by fuscous brown, and divided across cell by a light olive-brown line; a white line medially across cell, angled and following vein 8 to postmedial, which is fine, white, inwardly oblique to vein 5, then nearly obsolescent to submedian fold, limiting beyond cell the light brown shade; the costa postmedially streaked with white; a fuscous subterminal shade incurved to below vein 5, outset from vein 4 to submedian fold; a terminal fuscous line inwardly edged with white; cilia crossed by a whitish line. Hind wings greyish brown.

Expanse 24 mm.
*Hab.* Avangarez.
Near *E. cnossia,* Druce.

*Phobalosia grandimacula,* sp. n.

♂. Palpi and frons grey ; vertex fuscous brown ; iridescent golden scales between antennæ; collar, thorax, and abdomen whitish, thickly covered with fine wavy grey lines ; anal hairs fuscous brown. Fore wings whitish, thickly covered with transverse brownish striæ ; traces of an antemedial geminate grey line, forming three outward curves ; a very large round brown-black spot at and beyond end of cell, followed by a fine dark postmedial line, slightly excurved; a subterminal dentate white line, preceded by a brown shade on costa; an interrupted dark terminal line. Hind wings whitish, suffused with grey ; a dark terminal line. Hind wings below with a dark discal point and a postmedial line angled at vein 4.
Expanse 16 mm.
*Hab.* Tuis, Juan Vinas.

*Casandria arœa,* sp. n.

♀. Palpi grey ; head grey, shaded with light brown laterally and behind, a fuscous line between antennæ ; thorax and abdomen grey, somewhat shaded with brown, the last two segments dorsally and laterally brown. Fore wings dark grey ; the subterminal area suffused with white ; a basal and antemedial excurved brownish shade, the latter followed by a whitish spot in and below cell to submedian, containing a cluster of black scales on fold, and is partly edged below with brownish ; an incurved dark grey shade on discocellular, followed by a small white spot ; beyond cell a brown line, forming a vague " 8." Hind wings silky greyish brown.
Expanse 23 mm.
*Hab.* Sixola.

*Celiptera montana,* sp. n.

♂. Body dull brownish grey. Fore wings grey, irrorated with brown ; an indistinct basal and subbasal darker grey line ; an antemedial straight buff line, outwardly shaded with reddish and then olive-brown, becoming greyer towards costa ; a similar line from vein 9 at 2 mm. from apex to inner margin near tornus ; the intermediate space crossed by four darker grey and indistinct lines ; reniform large, outlined in

greyish buff, preceded by a velvety brown point; a dark point on inner margin before antemedial, not always present; a straight subterminal row of black spots; an irregular row of marginal fuscous points. Hind wings greyish brown, shaded with fuscous beyond a pale straight subterminal line; the termen greyish, with minute black points. Underneath dark greyish brown. Hind wings with long hairs at base and along inner area.

Expanse 42 mm.

The female is browner and without the spot on inner margin.

*Hab.* Juan Vinas, Tuis, Laguna.

*Cœnipeta sublimis*, sp. n.

Palpi dark brown, with a fine lateral white line. Head, collar, and thorax dark brown; black shadings on patagia. Abdomen fuscous brown, with paler transverse lines posteriorly on segments. Fore wings dark brown, with fuscous shadings; a basal light brown line, followed by a dark space; an antemedial light brown line, geminate, enclosing a dark triangular spot on costa, diverging and enclosing a dark spot below cell, followed by some lilacine white scales between submedian fold and vein; a vague dark medial line; a buff-brown shade from costa through reniform, which is outlined by a white and yellowish line, wide apart and not meeting behind, the inner portion continuing as a light brown line, outwardly oblique to submedian, where it is angled and joined by a short similar line from near middle of inner margin; the postmedial indistinct, outcurved, and terminating at vein 4, edged with black; the postmedial space below vein 4 clearer brown; a subterminal ochreous brown line, dentate from vein 8 to near 5, then broader and slightly incurved to inner margin; marginal black spots outwardly shaded with lighter brown; a faint terminal dark line. Hind wings fuscous brown; a wavy light brown postmedial line; a grey-brown subterminal shade, interrupted by a fuscous projecting line on vein 6; terminal white streaks on veins 2, 5, and 6; a terminal black shade with a white point between 6 and 7; three round marginal black spots between 2 and 5. Fore wings below paler; a whitish-buff spot at end of cell; three medial spots on costa at origin of indistinct lines; white and buff mottlings above tornus and below apex; subterminal white near costa. Hind wings below with geminate medial and postmedial dark lines and a black and buff line at

end of cell; a pale subterminal line; a black spot between 6 and 7 with a white point.

Expanse 51 mm.

*Hab.* Juan Vinas, Tuis.

*Stictothripa delaia*, sp. n.

♀. Palpi mottled brown and white. Body white; transverse grey shades on abdomen. Fore wings white, irrorated with grey and mottled with pale yellow beyond cell and postmedial line; an indistinct grey basal line; antemedial fine, dark grey, wavy, more deeply outcurved below submedian; a medial fuscous shade on costa to discocellular, which is crossed by a broad velvety fuscous-brown line, obliquely curved to subterminal at vein 2; postmedial fine, black, irregularly outcurved, straight from vein 2 to submedian, on which it is deeply and finely toothed towards base; subterminal fine, greyish brown, followed by a similar terminal spot between 3 and 4, below 3 inbent to vein 2, and then heavily marked velvety fuscous brown, inwardly shaded with light brown to tornus; cilia yellow, shaded with brownish spots and tipped with white. Hind wings white; a curved fuscous line on discocellular, a postmedial punctiform line becoming linear on inner margin; veins and outer margin silvery, the latter broadly shaded with fuscous grey; darker subterminal streaks on veins and a fuscous line from vein 2 to anal angle; a dark terminal line.

Expanse 40 mm.

*Hab.* Sixola.

*Concana lepida*, sp. n.

Palpi light brown, spotted with dark brown; a white spot on frons above proboscis, otherwise frons, vertex, collar, and thorax mottled fuscous brown and buff, with some white scales posteriorly on collar and long spatulate scales on thorax; abdomen fuscous grey and brown, with high dorsal tufts. Fore wings buff-brown, crossed by numerous irregular lunular dark brown and black lines; a blue-grey streak on submedian medially and beyond, and an oblique whitish shade above it to vein 2; an excurved white line at end of cell, the veins before it and vein 2 blue-grey; veins 3, 4, 6, and 8 whitish on postmedial area; end of cell and postmedial space between 6 and 8 blue-grey; a whitish shade between 5 and 6; some marginal whitish-buff shadings. Hind wings whitish, thinly scaled with brown; the veins and outer margin dark brown; a subterminal whitish-buff line, interrupted

by the veins; cilia whitish, divided by a brown line. Fore wings below fuscous grey; a black point and white line postmedially on costa; a subterminal irregular white line. Hind wings white; a wavy fuscous medial line; a dentate postmedial line; a heavier fuscous subterminal shade and some marginal shadings.

Expanse 35 mm.

*Hab.* Juan Vinas.

*Concana magnetica*, sp. n.

♀. Body dark lilacine brown; a fuscous-brown transverse shade anteriorly on collar, and similar dorsal tufts on first and third segments of abdomen. Fore wings dark lilacine brown, the markings fuscous brown; a basal line with some lilacine blue scales below cell; an antemedial shade outwardly curved from subcostal to submedian, and inwardly shaded with lilacine blue scales; a medial line across discocellular, interrupted between cell and vein 2, outcurved from 2 to submedian, inbent below it, preceded in cell by a curved line and followed beyond cell by a cluster of lilacine scales; postmedial only faintly excurved from costa to vein 2, then parallel with medial line, inwardly shaded with lilacine blue from costa to vein 2; an irregular lilacine-blue subterminal shade, followed by dark brown spots at apex, vein 4, and below vein 3; terminal dark intervenal spots. Hind wings: the base to beyond cell and inner margin white, shot with lilacine blue; the costal and outer margin broadly black-brown; a fine dark line along inner margin; whitish streaks at and above anal angle.

Expanse 35 mm.

*Hab.* Sixola.

*Concana lecta*, sp. n.

Palpi reddish brown in front, fuscous behind. Head and collar reddish brown; a fuscous shade posteriorly on collar. Thorax darker reddish brown, the patagia tipped with fuscous. Abdomen fuscous above; a dorsal red-brown tuft on third segment. Fore wings brown, darkest at base and on inner margin medially; some black at base of costa; a tuft of light brown scales on base of submedian; a fuscous geminate antemedial curved line, filled in with light brown and shaded with dark red below cell to near submedian; orbicular large, irregular, lighter brown, edged with whitish buff and a few dark red scales; a fuscous medial line, preceded by a

whitish-grey shade below cell; reniform space to postmedial lighter brown, crossed by vague lilacine and greyish scales; postmedial irregular, whitish buff, preceded by a black shade between 4 and 5 and from vein 2 to inner margin, and is also edged with fuscous and darker brown; veins 3 and 4 whitish; a wavy whitish subterminal line, preceded by a black space on costa and a large spot above vein 4; small terminal lunules inversely placed, their curves suffusing and shaded with golden brown. Hind wings dark brown; a faint discal spot; subterminal shade and terminal line, also a reddish-brown spot at anal angle. Hind wings below whitish, irrorated with light and dark brown; a medial shade before discal point; a postmedial lunular line; a subterminal shade.

Expanse 28 mm.

*Hab.* Avangarez, Juan Vinas.

*Concana intricata*, sp. n.

♂. Palpi and head mottled lilacine buff and brown; some white at base of antennæ and close to eyes. Collar light brown, broadly edged behind with dark brown and white. Thorax brown, the patagia shaded with silvery white. Fore wings light silky bronze; the base irrorated with lilacine, leaving a vague basal and subbasal clear line on costa and cell; an antemedial clearer brown shade angled in cell; a parallel median shade angled on median, widest below cell, closely followed by a fine lunular line, these lines indicated by faint silvery scaling between them; some white scaling beyond discocellular anteriorly and at base of veins 3–5; a faint postmedial interrupted line and broad, oblique, darker brown shades to before termen from vein 2 to tornus, from above 5 to vein 2, and from costa to vein 4, also smaller spots from costa to vein 6; terminal intervenal spots; whitish points at tips of veins. Hind wings whitish brown; the veins, a discal spot, and postmedial line darker; the outer margin broadly fuscous brown; a faint submarginal whitish line. Hind wings below whitish, shaded with brown on costa and outer margins; a medial brown line; a dark streak on discocellular; a finely dentate postmedial line, with white streaks on veins 3–8; some white scaling on outer margin.

Expanse 29 mm.

♀. More mottled with white; an oblique white line beyond cell, followed by a velvety fuscous-brown shade

between 4 and 6, interrupting a subterminal white line at vein 5 ; a wavy marginal white line.

Expanse 27 mm.

*Hab.* Avangarez, Tuis, Sixola.

*Dyops? telharsa*, sp. n.

♂. Frons and a spot between antennæ reddish brown; head otherwise and collar whitish buff, mottled with brown. Thorax silvery white, with a few brown irrorations ; a dark brown medial spot and dark tips to tufts behind. Abdomen white, irrorated with brown; anal hairs and small dorsal tufts dark brown. Fore wings silky brown, with darker brown medial, postmedial, and subterminal shadings ; antemedial finely dentate, inbent from subcostal to submedian, crossing the inner edge of a narrow white fascia ; a white streak medially along inner margin ; an oblique white line from reniform to vein 2 and some white scaling on inner margin on either side of postmedial. Hind wings fuscous brown ; a finely dentate postmedial darker line, preceded and followed towards inner margin by a buff-brown shade.

Expanse 33 mm.

*Hab.* Esperanza.

*Dyops? telmela*, sp. n.

Head and thorax buff; collar and patagia shaded with grey and dark brown. Abdomen buff-brown, with paler segmental lines and some dark brown dorsally. Fore wings brownish grey ; the costa mottled with white and light brown ; an indistinct basal line ; the antemedial fine, oblique from costa, inset in cell, and below median edging a broad transverse dark olive-brown fascia, which is also crossed by a black shade ; postmedial remote, oblique from vein 8–6, incurved between 6 and 4, heavily marked, velvety black, fine and inbent to vein 2 and medial fascia, which it edges, to inner margin, and is again heavily marked ; reniform pale brown, incurved ; a subterminal buff line, wavy near costa, where it is preceded by a dark brown spot, dentate, lunular below vein 4 ; an oblique brown shade from postmedial to termen at vein 4 ; a terminal dark line connecting intervenal spots. Hind wings brown ; a darker shade on discocellular ; a terminal darker brown line preceded by some whitish-grey scaling ; a pale spot above anal angle, surmounted by a dark point.

Expanse 31 mm.

*Hab.* La Florida.

*Arugisa oppressa*, sp. n.

♀. Head and thorax dark brown, tinged with blue-black. Abdomen fuscous brown. Fore wings to postmedial line bluish black, tinged with brown; a fine velvety antemedial line, faintly irrorated with grey; a velvety black point as orbicular; a velvety fine black line on discocellular; postmedial fine, blackish, slightly irrorated with grey, with rounded projections above veins 2, 3, 4, 6, and 7; outer margin broadly brown, with an irregular subterminal darker shade and terminal dark brown points between the veins. Hind wings fuscous brown.

Expanse 25 mm.

*Hab.* Sixola.

*Baniana pastoria*, sp. n.

♂. Palpi and collar ochreous brown, the latter in front dark reddish brown; head buff, dark reddish brown close to collar; thorax and abdomen buff, with a few dark irrorations; a dark reddish-brown transverse line close to collar and black segmental lines on abdomen. Fore wings buff, irrorated and shaded with dark olive-brown, chiefly along costa and beyond lines which are rather broad, clear buff; the antemedial somewhat oblique, the postmedial slightly sinuous; the dark subterminal shade inwardly edged with buff, inset and outwardly oblique from 6–3, and again from 3 to tornus; marginal black points between the veins; cilia dark olive-brown; two black points on discocellular. Hind wings buff, with a few dark irrorations on outer margin and some brownish hairs on inner margin; terminal black points between the veins; cilia buff; the black discal spot and postmedial punctiform line of underside faintly visible.

Expanse 31 mm.

*Hab.* Juan Vinas.

*Baniana strigata*, sp. n.

♂. Palpi light brown. Head and collar olive-buff. Thorax and abdomen buff, with dark irrorations. Legs buff; the tarsi streaked and circled with black. Fore wings brownish buff, crossed by numerous close-set brown lines, rather darker subterminally, and crossed by a sinuous brown shade from vein 6 to apex; an antemedial and a postmedial dark spot on costa; two black points on discocellular; marginal small black spots between the veins; cilia buff just below apex and at tornus, otherwise dark brown. Hind

wings yellowish buff; a black discal spot ; brownish hairs on inner margin; a terminal black line interrupted by veins. Underneath yellowish, with darker irrorations, the inner margins clear paler yellowish ; fore wings with a black line on discocellular and a curved dentate black line from vein 5 to costa ; hind wings with a black discal spot and postmedial line ; terminal black spots on both wings.

Expanse 31 mm.

*Hab.* Sixola, El Sitio.

*Tyrissa perstrigata,* sp. n.

Palpi dark brown. Frons white. Vertex and collar lilacine white, irrorated with brown, the collar edged behind with brown. Thorax and abdomen darker grey, the former irrorated with pale grey. Fore wings dark brown, the base with outcurved fine grey lines partly coalescing; some grey in cell and a black point as orbicular ; two brownish spots on discocellular ; a postmedial lighter brown line, outbent along costa, lunular to vein 4, partly shaded with fine short transverse whitish lines, very oblique from vein 4 to inner margin, and preceded below 5 by four fine greyish lines and above 5 by a broader greyish shade ; subterminal line like postmedial, preceded and followed by grey; a terminal black line ; extreme costa spotted with buff and white ; the outer margin produced at apex and vein 4, crenulate and very oblique below 4. Hind wings dark brown, the medial area crossed by seven fine greyish lines ; the postmedial finely lunular, lighter brown, spotted with white outwardly and followed by a grey line; the subterminal preceded and followed by greyish lines from vein 5 to inner margins. Underneath dark brown ; the medial area crossed by fine lilacine-blue lines ; fore wings with a white postmedial spot on costa and a bluish-white streak towards apex ; the costa narrowly ochreous buff.

Expanse 30 mm.

*Hab.* Guapiles, Tuis, Juan Vinas.

Near *T. laminata,* Butl.

*Rhosologia atomosa,* sp. n.

♂. Head, collar, and thorax olive-grey ; a central black line on vertex and collar; palpi laterally and below black. Abdomen grey, irrorated with black and clothed with brown hairs. Fore wings olive-grey, irrorated rather thinly with black scales and faint dark striæ ; a black point at base of cell ; a faint dusky antemedial shade, angled on costa, and with a small cluster of black scales below submedian fold ;

orbicular a black point; reniform large, reddish brown, crossed by a fuscous line, preceded by a black line anteriorly in cell, suffusing with a velvety black spot below vein 5, and connected with costa by a fine angled black line; a fuscous-brown shade from apex, inbent at vein 6, outcurved and less distinct below 5; terminal black points. Hind wings light brown at base, shading to fuscous on outer margin; the veins fuscous on outer half; minute terminal black points; cilia golden yellow.

Expanse 43 mm.

*Hab.* Juan Vinas.

Allied to *R. pallida,* Schs., and *R. sabata,* Druce.

*Rhosologia pallida,* sp. n.

♂. Head, collar, and thorax yellowish buff, the palpi laterally black. Abdomen above buff, shaded with reddish brown, laterally thinly irrorated with black. Fore wings yellowish buff, with some scattered brown striæ; a light brown point as orbicular; reniform large, diffuse, mottled dark grey and brown; an elongated velvety black spot at cell below vein 5; a faint brownish angled shade from costa to reniform; a vague subterminal shade irrorated with ochreous, beyond which the margin is faintly darker; terminal dark points between the veins. Hind wings thinly irrorated with fuscous; the veins slightly brown; terminal black points larger than on fore wings; cilia yellowish buff.

Expanse 39 mm.

*Hab.* Juan Vinas.

*Herminodes juvenis,* sp. n.

♂. Palpi dark brown, streaked with white above. Head, collar, thorax, and fore wings whitish, thinly irrorated with dark brown. Abdomen buff-brown. Fore wings: no orbicular; reniform faintly outlined by brown scales; a post-medial series of small clusters of brown scales, connected on costa and inner margin; a subterminal lunular dentate line, very fine and indistinct; outer margin suffused with brown; fuscous-brown terminal spots. Hind wings pale buff, irrorated with brown on outer half; a terminal fuscous line, interrupted by veins.

Expanse 25 mm.

*Hab.* Tuis.

*Herminodes subclara,* sp. n.

Palpi dark olive-brown, fringed above with whitish.

Head, collar, and thorax buff-white, streaked with fine light brown hairs. Abdomen faintly tinged with grey. Fore wings whitish buff, thinly irrorated with olive-brown scales; a velvety black spot at base of cell; a slightly larger similar spot as orbicular; reniform similar in colour, more elongated, oblique, slightly excised on its outer side; a velvety streak below cell, extending partly into it, and almost connecting the two spots; a postmedial and a subterminal dark lunular dentate line, very indistinct; a lunular dark terminal line, interrupted by veins and outwardly edged with creamy buff; cilia with dark greyish-brown shades at ends of veins. Hind wings pale buff, irrorated with fuscous grey; a faint dark shade on discocellular. Underneath whitish buff, indistinctly shaded with darker scales, and no discal spots, only a black point as orbicular on fore wings.

Expanse 40 mm.

*Hab.* Tuis, Guapiles, Juan Vinas.

Allied to *H. concatinalis*, Wlk.

*Herminodes valida*, sp. n.

Palpi black, fringed above with pale buff. Head and thorax pale buff. Abdomen pale buff. Fore wings pale buff, thinly irrorated with black scales; a velvety black point at base of cell; antemedial ochreous points on median and submedian; a minute ochreous point as orbicular; reniform a small ochreous lunule, irrorated with black; a postmedial row of ochreous and black clusters of scales, very small; a subterminal row of ochreous and black lunular dentate marks, slightly larger than postmedial spots; a marginal row of black intervenal points. Hind wings fuscous grey; the cilia ochreous buff, extending on terminal area. Fore wings below fuscous grey; hind wings buff, thickly irrorated with fuscous; small black spots on discocellular; a terminal black line; a postmedial darker interrupted shade; cilia ochreous buff, with clusters of dark scales at veins.

Expanse 45 mm.

*Hab.* Sixola, Banana River.

*Herminodes madrina*, sp. n.

♂. Palpi outwardly fuscous brown, interiorly and tips pale buff. Head and thorax creamy buff. Abdomen greyish buff. Fore wings creamy buff, thinly irrorated with dark brown scales; a black point at base of cell; a dark point as orbicular; reniform large, fuscous grey spotted with ochreous, inwardly edged by a lunular fuscous-brown line; a post-

medial and a subterminal row of small dentate dark brown spots; a terminal row of fuscous-brown points between the veins. Hind wings creamy buff, thickly overlaid with fuscous scales; cilia creamy buff. Underneath thinly irrorated with fuscous scales; fuscous spots on discocellular.

Expanse 43 mm.

*Hab.* Sixola, Esperanza.

Allied to *H. discata*, Schs.

*Herminodes ? venosa*, sp. n.

♂. Palpi reddish brown laterally and below, buff above, spotted with brown; fringe in front very long. Head and collar buff-white; a central fuscous line. Thorax buff-brown. Abdomen fuscous brown above, underneath and anal hairs buff-white. Fore wings brown, shaded with buff below costa and on outer margin; veins buff; an antemedial black point below cell; orbicular a black point, followed by a darker shade to reniform, which consists of a buff spot; a postmedial dark curved line cut by veins into small spots; an indistinct subterminal black shade, partly shaded outwardly with buff; terminal black points between the veins. Hind wings fuscous; the cilia tipped with buff. Underneath brownish buff, the disc of fore wings shaded with fuscous; hind wings with a black discal spot, a postmedial fuscous shade, and an interrupted terminal black line. Fore legs with long tufts of black hairs.

Expanse 31 mm.

Female: the fore wings buff, irrorated with brown, otherwise the markings are as in the male.

Expanse 35 mm.

*Hab.* Sixola River.

*Orsa uzza*, sp. n.

♂. Palpi dark grey-brown, mottled in front with buff, the segments tipped with buff. Head and collar brown, the frons mottled with yellowish white. Thorax dark steel-grey. Abdomen above dark brown, at base followed by steel-grey, the two last segments buff, crossed by fine wavy light and fuscous-brown lines, the anal hairs whitish buff. Fore wings dark steel-grey tinged with brown; the costa finely buff to postmedial line, then spotted with white; an antemedial and a medial fine wavy dark brown line; a black point as orbicular; an interrupted black line on discocellular, edged with lighter grey; postmedial fine, dark brown,

slightly outcurved and wavy from costa to vein 4, and outwardly shaded with dull dark brown; an irregular and indistinct dark subterminal shade with lighter grey points between the veins; a terminal black line; cilia black, tipped with white near apex and from vein 3 to tornus, and shaded with ochreous brown basally above tornus. Hind wings dark steel-grey; a black medial line followed by a broad light brown space, not reaching inner margin and containing a black point on discocellular behind; a straight postmedial line, paler steel-grey edged on either side with dark brown; a terminal black line; base of cilia ochreous brown, followed by fuscous and tipped with whitish. Wings below whitish, crossed by numerous black striæ, and wavy medial and postmedial black lines, the disc of fore wings strongly shaded with brown; a black shade connecting the lines below cell, and the terminal area below apex shaded with black; hind wings with the outer margin broadly black, on which are some subterminal pale spots.

Expanse 33 mm.

*Hab.* La Florida.

*Thermesia ? subdentata*, sp. n.

Palpi orange, shaded with fuscous brown laterally; frons reddish irrorated with lilacine; vertex and collar velvety brown-black; thorax greyish brown irrorated with lilacine; abdomen dark grey. Fore wings yellowish buff striated with dark grey; a dark shade at base irrorated with lilacine, expanding below cell and there limited by an inwardly oblique fuscous line, which is outbent below submedian; an antemedial dark brown line on costa; a medial irregular transverse olive-brown shade preceded by some reddish irrorations in and below cell; reniform much constricted anteriorly, its edge preceded by a velvety brown-black line; postmedial dark olive-brown, outbent from costa, followed by a lilacine line from vein 8, and another brownish line from vein 6, from which point it is inwardly oblique and slightly sinuous; a broad lilacine shade follows from vein 4 to inner margin; the terminal area more heavily striated, and an irregular row of black subterminal spots; base of cilia reddish brown. Hind wings grey-brown tinged with olive; a postmedial black line, expanding on inner margin and there geminate; cilia dark brown, with a reddish line at base, and tipped with lilacine scales. Fore wings below dull greyish brown, the costa shaded with ochreous; a white point on discocellular closely followed by a dentate fuscous

line. Hind wings below paler, irrorated with dark brown and lilacine; a velvety black spot on discocellular edged with white, followed by a very deeply dentate fuscous-brown line; marginal white points between the veins.

Expanse 44 mm.

*Hab.* Poas.

*Bendis ?siaha*, sp. n.

♀. Head, collar, and thorax dark brown; a white line between antennæ curved towards frons; the shaft of antennæ spotted with white. Abdomen grey-brown, a transverse fuscous-brown streak at base. Fore wings brown tinged with lilacine; the base darker, becoming black-brown towards antemedial, which is oblique from costa, angled below cell and inwardly sinuous to inner margin; the antemedial on costa, and a fuscous basal line on costa, finely edged with whitish; a whitish medial and a similar postmedial line on costa, the latter continuing as a fine and indistinct greyish-brown line angled beyond cell; a fine buff streak on discocellular; the postmedial followed by a brown outcurved and sinuous line, edged with white on costa, then with buff and light brown to vein 6, and below 6 to inner margin with black-brown; a subterminal buff-brown line incurved before apex, inwardly shaded with black-brown and followed by a dark grey shade and black-brown spot, dentately inbent to vein 6, outbent to termen between 4 and 3, and incurved to tornus; below vein 6 the subterminal is preceded by a dark grey-brown shade; a terminal buff line. Hind wings brown faintly shaded with violaceous; a medial, postmedial, and terminal buff line; a very faint subterminal lunular line; a minute white streak on discocellular. Wings below brown; wavy medial and postmedial white lines; marginal white shadings, and white streaks on discocellulars.

Expanse 28 mm.

*Hab.* Avangarez.

Allied to *Bendis mascara*, Schs.

*Isogona bilinea*, sp. n.

♀. Palpi, head, and collar olive-brown; thorax and patagia lilacine brown; abdomen fuscous grey. Fore wings chiefly greyish brown, thinly irrorated with black; antemedial line angled on extreme costa, nearly straight to inner margin, roseate, inwardly shaded with olive-brown; a black point as orbicular; reniform large, pale olive-brown finely outlined with black; postmedial line remote, finely angled

on extreme costa and straight to inner margin near tornus, olive-brown, divided by a slightly paler line, and followed by a roseate shade; outer margin shaded with olive-brown; subterminal small black spots, some of them shaded with white; a terminal dark brown line; cilia dark grey with a pale line at base. Hind wings fuscous brown; a postmedial fine dark line, curved near tornus.

Expanse 34 mm.

*Hab.* Juan Vinas.

*Oroscopa delicata*, sp. n.

♂. Palpi brown and black, the third joint buff, broadly circled with black. Body yellowish buff. Fore wings buff tinged with brown, chiefly on costa; some scattered black scales at base; a greyish spot at end of cell; a fuscous antemedial and postmedial shade on costa, the latter followed by a fine line, outcurved from costa and incurved between 7 and 4, very oblique inwardly from 4 to inner margin before middle, brownish, outwardly shaded with whitish buff and preceded from vein 4 to inner margin by three fine whitish-buff lines; a dark brown streak on inner margin beyond middle, followed by a brown spot crossed by a transverse whitish line; the outer margin shaded with brown between 5 and 8; terminal dark brown spots preceded by whitish streaks. Hind wings buff, crossed medially by numerous fine darker lines; a dark brown spot on costa before apex; a transverse dark brown line from near apex to anal angle, followed by a lighter brown line and some greyish striæ; an interrupted dark terminal line. Hind wings below with the outer margins broadly shaded with fuscous grey.

Expanse 24 mm.

*Hab.* Guapiles.

*Oroscopa calverti*, sp. n.

♀. Palpi buff, transversely streaked with brown. Head, collar, and thorax whitish buff, the collar anteriorly shaded with dark brown. Abdomen buff, dorsally shaded with fuscous brown; lateral and sublateral black spots. Fore wings buff, crossed by fine greyish-brown striæ; a curved and indistinct greyish antemedial shade; a greyish spot on discocellular, crossed by a curved black line; an oblique brown postmedial line on costa, followed by an evenly curved row of somewhat lunular fuscous-brown spots from costa to inner margin; a subterminal heavy rich brown line straight from below costa to below vein 5, then slightly outcurved

and faintly marked, inbent and again heavily marked on inner margin, and followed by a pale line and then partly with fuscous; the margin shaded with grey; terminal brown-black spots between the veins preceded by whitish streaks. Hind wings buff, crossed by pale brownish lines; a semilunar fuscous-brown line on discocellular coalescing with a small spot; a postmedial row of fuscous-brown spots, the largest on costa and connected by a whitish-buff dentate line; a subterminal dark brown line; outer margin as on fore wings. Fore wings below brownish, the outer margin shaded with grey; a subbasal and wavy medial fuscous line inversely oblique; a black point in cell; the discal spot followed by a short whitish streak; a postmedial row of fuscous spots, the spot between 5 and 6 inset; subterminal darker brown spots. Hind wings below buff, irrorated thinly with black; outer margin like fore wings; an antemedial wavy black line; a round black spot cut by pale discocellular; an irregular postmedial row of black spots; a subterminal brownish line.

Expanse 35 mm.

*Hab.* Juan Vinas.

Named after Prof. P. P. Calvert, to whom I am indebted for a specimen.

*Oroscopa hacupha*, sp. n.

♀. Palpi and abdomen buff-brown, irrorated with dark brown and black. Head and thorax clear buff-brown. Collar dark brown, pale shaded behind. Wings buff-brown, irrorated with a few dark scales. Fore wings: the costal margin crossed by greyish striæ; a fine brownish antemedial curved line; a fuscous spot at end of cell containing some grey scales; an irregularly outcurved brownish line, very oblique from vein 4 to inner margin, followed by five fine brownish lines, chiefly noticeable on inner margin; traces of a subterminal darker line, much interrupted; some slightly darker terminal shadings from below 5 to 6 and at tornus; terminal dark points between the veins. Hind wings: eight transverse brownish lines, darkest medially, almost obsolete near subterminal, which is reddish brown, interrupted before costa, and followed by a fuscous-grey shade; a row of small postmedial black spots, the one near costa larger and triangular. Wings below buff, shaded and irrorated with brown; irregular fuscous medial and postmedial lines.

Expanse 36 mm.

*Hab.* Sixola.

*Capnodes rubrifusca*, sp. n.

♂. Head and collar red tinged with ochreous; thorax and dorsal tufts on abdomen darker red, the abdomen otherwise dark greyish brown above with luteous anal hairs. Wings dark brownish red; a postmedial blackish line, slightly oblique. Fore wings: a fine straight blackish antemedial line; a small dark spot in cell; a dark line on discocellular; a darker red irregular subterminal line, inbent at veins 6 and 2. Hind wings: the costal margin shaded with black.

Expanse 40 mm.

*Hab.* Juan Vinas, Sixola.

*Capnodes pleione*, sp. n.

♀. Head and collar dark brown; patagia and abdomen fuscous brown. Wings dark brown faintly tinged with purplish. Fore wings: a fine brown antemedial line with white points on veins, and followed by a fuscous shade, darkest in cell; a medial fuscous shade darkest in cell; a fine fuscous line on discocellular; a fine postmedial line with white points on veins, starting from a large costal spot, inwardly white, outwardly ochreous, and partly filled in with brown; subterminal black points between the veins; a terminal black line. Hind wings: a fuscous medial and postmedial shade, the latter with minute whitish points on veins; subterminal black points between the veins.

Expanse 33 mm.

*Hab.* Juan Vinas.

Near *C. sterope*, Cr., but darker than that species.

*Capnodes addana*, sp. n.

♂. Body and wings dull dark brown. Fore wings: the lines fine, darker brown; the antemedial straight, finely wavy, faintly edged with ochreous brown; the postmedial slightly outcurved, finely wavy, outwardly edged with ochreous brown from vein 7–2; a black point at base of subcostal; reniform indistinct, rather darker; small clusters of black scales subterminally between veins; terminal black points between veins connected by a fine dark line. Hind wings: two black points on discocellular; a finely wavy postmedial line outwardly edged with ochreous brown; subterminal spots and terminal points as on fore wings.

Expanse 28 mm.

*Hab.* Juan Vinas.

*Capnodes peruda*, sp. n.

♀. Body and wings brown. Fore wings faintly tinged with lilacine; an antemedial and a postmedial white spot on costa from which the lines start, both lighter brown and darkly edged towards medial space; the antemedial slightly inbent, the postmedial outcurved beyond cell; reniform large, a brighter brown darkly edged; faint subterminal greyish spots; a fine dark crenulate line, punctiform between the veins. Hind wings thinly irrorated with black; a postmedial line as on fore wings; the subterminal spots more distinct.

Expanse 23 mm.

*Hab.* Juan Vinas.

*Capnodes? chephira*, sp. n.

♂. Head and collar light brown. Thorax and dorsal tufts on abdomen reddish brown; abdomen otherwise fuscous brown. Wings dark reddish brown. Fore wings: costa shaded with light reddish brown; a white spot at base below cell and at apex; a large medial white space below subcostal where it is widest, its inner edge straight, rounded above submedian and oblique towards apex, containing a dark brown streak on discocellular and a spot in cell, into which the white projects on basal side; a medial small white streak on inner margin and on costa; small subterminal white spots below apical spot and near tornus. Hind wings: a small white spot at end of cell; a row of subterminal white spots followed by larger spots between 4 and 7 and at anal angle; cilia on both wings black, with small white spots.

Expanse 25 mm.

*Hab.* Sixola, Tuis, Juan Vinas.

*Exua barzillai*, sp. n.

♂. Palpi, head, collar, and thorax brown, the patagia faintly tinged with lilacine; abdomen above fuscous brown, with light brown transverse shades. Fore wings: the basal third brown limited by a straight antemedial line, darker brown outwardly edged with dull roseate, a black point at base of cell; medial space light brown tinged with grey near antemedial line, and with darker brown near postmedial from below reniform to inner margin; reniform large, outlined in buff and dull roseate; postmedial line angled at vein 6, fine, buff, inwardly edged with dark brown; outer space light

brown tinged with grey and irrorated with black; subterminal black spots between veins, partly shaded with white; a fuscous shade near tornus; a terminal buff line preceded by a faint dark brown shade; cilia fuscous. Hind wings fuscous brown; an indistinct buff straight medial line.

Expanse 28 mm.

*Hab.* Juan Vinas, Tuis.

*Obroatis vinea*, sp. n.

♂. Head, collar, and thorax dark reddish brown, the palpi tipped with brown; abdomen lilacine brown, with dorsal reddish tufts. Fore wings dark reddish brown, limited by a nearly straight fuscous line beyond cell, broadly shaded beyond with lilacine, which is crossed by a fine, outwardly lunular, postmedial reddish-brown line; the extreme costa light reddish brown, and below it some lilacine irrorations; traces of a fine darker antemedial line; orbicular a dark brown point; reniform ochreous buff edged with dark red, its margin inbent or consisting of two round superposed spots; indistinct fuscous-grey subterminal points; the termen shaded with dark reddish brown; a pale line at base of cilia. Hind wings dark reddish brown to a fine fuscous medial line, which does not reach costa; costal margin luteous; postmedial line less distinct than on fore wings; outer space tinged with lilacine, only the extreme outer margin reddish brown.

Expanse 43 mm.

*Hab.* El Sitio, Juan Vinas.

*Ephyrodes repandens*, sp. n.

Head, collar, and thorax reddish brown. Abdomen greyish shaded with brown at base, thinly irrorated with black. Fore wings greyish brown, thinly irrorated with black; a fine black antemedial wavy line, deeply inbent in cell; orbicular a small round black spot containing a white point; a narrow black medial shade oblique to reniform, inset and wavy below it; reniform consisting of two small black spots separated by a black line, all on an ochreous shade, with a black point above it and three black points in a curve below it; postmedial fine, reddish brown, partly irrorated with white, angled at vein 7, and obliquely irregular to inner margin; subterminal clusters of reddish-brown and white scales at angles of a faint reddish-brown shade, becoming darker at costa; terminal dark points connected by

a fine outwardly lunular black line. Hind wings greyer in tone, the costa whitish; a black medial line adjoining a white discal spot finely edged with black and containing a black point and some reddish lines; a straight postmedial black line; subterminal reddish-brown spots partly connected; the termen shaded with lilacine white on which are black points connected by a fine line.

Expanse 40 mm.

*Hab.* Juan Vinas.

This species is widely distributed and is the *E. implens* of the 'Biologia' (nec Walker).

*Orthogramma terranea*, sp. n.

Head, collar, and thorax brown, the collar darkest, tipped with buff posteriorly; abdomen grey, thickly irrorated with fuscous overlaid with brown hairs; the basal segment lighter. Wings brown, the veins paler. Fore wings: an antemedial inwardly oblique dark brown line, inwardly edged from subcostal to inner margin with lilacine white; orbicular extending across cell; reniform still larger, its outer margin incurved, both duller brown, outlined in dark brown outwardly edged with buff-brown; a postmedial pale line from costa, angled at vein 7, inwardly oblique to inner margin, preceded by a fine olive-brown line, and followed by a reddish-brown line outwardly edged with olive-brown, and which continues above vein 7 to apex, where it is preceded by a white line; subterminal white points shaded on either side with dark brown; a terminal dark line, punctiform in middle of interspaces; cilia ochreous brown crossed by a fuscous line. Hind wings: a dark brown discal point; a postmedial line similar to line on fore wings, also similar subterminal points and terminal line.

Expanse 45 mm.

*Hab.* Juan Vinas.

*Focilla invidiosa*, sp. n.

♂. Palpi brown irrorated with white, inwardly streaked with white. Head dark lilacine brown. Collar and thorax lilacine brown thinly irrorated with white. Abdomen above dull dark grey-brown. Wings lilacine brown. Fore wings: the basal third thinly irrorated with white; a curved basal white line on costa enclosing a brown point; a dark brown antemedial line inwardly edged with white scales, curved on costa, interrupted in cell, where it is replaced by the orbicular, a dark point, inwardly oblique from median to submedian,

where it is sharply outbent and angled below submedian; a dark medial line inwardly oblique, angled and inset on submedian; reniform large, buff-grey, with a darker line on discocellular; postmedial fine, black, indistinct, dentate, preceded by a large black spot at submedian; a geminate subterminal lunular line reddish brown and fuscous; a terminal lighter brown shade between 4 and 6; apex shaded with fuscous grey; marginal black points between the veins. Hind wings: the costa shaded with ochreous; fuscous hairs at base and on inner area; a heavy black medial line; an irregular black postmedial line; the subterminal geminate, coarsely dentate. Wings underneath buff-brown, finely irrorated with black; black discal points; a medial black line, obsolescent on clear yellowish inner margin of fore wings; postmedial very fine and indistinct; subterminal geminate, sinuous; the costa of fore wings shaded with white.

Expanse 50 mm.

*Hab.* Juan Vinas, Tuis.

*Glenoptera ornata*, sp. n

Palpi fuscous above, light brown below. Head and collar olive-buff. Thorax dark green. Abdomen black above, yellowish underneath. Fore wings green, darkest from base to medial line; the lines black, widest on costa; a basal line across costa and cell; a streak on inner margin at base; antemedial line slightly oblique to median, outbent to submedian fold, then straight to inner margin, preceded by an olive-green shade; medial oblique from costa to vein 4, where it projects, straight to fold, expanding along it, and inwardly almost touching the antemedial, which it follows to inner margin, and is also preceded, except on costa, by an olive-green shade; postmedial evenly outcurved, followed by a fuscous spot on costa and on inner margin; subterminal straight from costa to vein 6, inbent and angled close to 5, then outbent and along vein 4 to termen; a fuscous shade at tornus. Hind wings black; the apex broadly bright yellow. Underneath brown-black; a broad yellow postmedial fascia on fore wings and some yellow at apex; hind wings with a geminate medial black line, diverging towards inner margin; the apex broadly yellow.

Expanse 50 mm.

*Hab.* Tuis.

*Torone notabilis*, sp. n.

♀. Palpi white below, dark brown above. Head and body above dark lilacine brown. Thorax below white. Abdomen below crimson, ventrally shaded with yellowish white towards base. Fore wings lilacine brown, the veins with darker points; a fine dark brown antemedial line, outcurved on costa, incurved, oblique, to middle of inner margin; a dark brown medial spot on costa and a fine fuscous line across discocellular and straight to inner margin, preceded by a broad dark brown shade from vein 3 to inner margin and followed by a similar shade containing some whitish scales on inner margin, and extending above vein 3 towards apex, not quite joining a dark brown oblique shade from costa to outer margin; a terminal lilacine line from vein 3 to tornus, preceded by a dark brown shade. Hind wings: the base and inner area dark brown; a black fascia on discocellular and a crimson spot beyond it from veins 4–7, its inner edge straight, its outer edge rounded; a broad black shade from apex to inner margin near angle, leaving the outer margin from vein 6 to anal angle broadly crimson. Fore wings below yellowish; a black shade across end of cell, expanding outwardly at vein 3, and reaching submedian; a large yellow spot beyond cell followed by black spots from 7–3, divided by crimson streaks; the costa shaded with crimson from beyond middle to near apex; some terminal fuscous-grey shading. Hind wings below crimson, with darker spots on veins; a broad marginal yellow shade from vein 6 to anal angle.

Expanse 40 mm.

*Hab.* Tuis.

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## XXII.—*Some new Algerian Lepidoptera.*

By the Hon. Walter Rothschild, Ph.D.

### Family **Noctuidæ**.

1. *Eublemma faroulti*, sp. n.

♂. Legs and palpi very pale wood-brown; antennæ white, with brown pectinations; head and thorax white; abdomen creamy white. Fore wing creamy white, an interrupted orange-brown transverse band one-fourth from base, a

discocellular brown patch half joined to a brown curved transverse band beyond cell; costal margin orange-brown; a submarginal row of black dots; outer margin orange; fringe whitish grey, very broad (2 mm.). Hind wing creamy white, suffused with yellowish grey, with two obsolete darker clouded bands on disk; fringe 2 mm. broad, white.

Length of fore wing 16 mm.

*Hab.* Bou Saada, May 1911 (*Victor Faroult*).

2. *Cleophana bætica diluta*, subsp. n.

Differs from *bætica bætica* in the ground-colour and fringes being white, not mauve-grey, and the dark markings on each side of the transverse bands shining pale yellowish wood-brown, not blackish brown; thorax whitish, not dark grey.

*Hab.* A large series from El Outaya and Bou Saada (type), April and May (*Victor Faroult*).

Intermediate specimens occur in Asia Minor and Greece.

3. *Cucullia oberthueri*, sp. n.

♂. Head woody buff; antennæ whitish; tegulæ cream-colour, edged with brown; patagia cream-colour, faintly tinged with grey; thorax black-brown; abdomen brown-buff, claspers deep buff. Fore wing cream-colour; costal and subcostal area sooty grey-brown; a few brown striæ running in from outer margin; an oblique brown irregular band runs from base of inner margin to vein 3 at outer margin; three minute black dots in cell on median vein. Hind wing cream-colour, veins yellowish brown.

Length of fore wing 22 mm.

*Hab.* 2 ♂♂, Bou Saada, May 1911 (*Victor Faroult*) (type); 1 ♂, El Kantara, S. Algeria, April 1911 (*Victor Faroult*).

Family **Geometridæ**.

4. *Scodiona albirosea*, sp. n.

♀. Legs sooty grey; head and thorax white, washed with rose; antennæ white; abdomen dirty white. Fore wing very pale whitish rose, suffused on basal three-fourths with darker rose and sparsely powdered with blackish dots; an interrupted, brick-red, zigzag, transverse line one-third from base, two brick-red patches on costa, and a similar discocellular one; a zigzag brick-red transverse line beyond cell, much clouded all round with brick-red; marginal line orange.

Hind wing pinkish white; an indistinct discal band and a series of dots on abdominal area brick-orange; marginal line orange.

Length of fore wing 21 mm.

*Hab.* Bou Saada, May 1911 (*Victor Faroult*); 1 ♀.

### Family **Arctiadæ**.

5. *Phragmatobia faroulti*, sp. n.

♂. Pectus yellowish wood-brown; tarsi rosy red; palpi, head, and antennæ sooty brown-black; thorax and abdomen sooty brown, tips of tegulæ, patagia, and abdomen clothed with brownish-white hairs. Fore wing dark dull wood-brown, suffused with sooty black; outer margin 3 mm. wide, except termen, sooty black; rest of wing with ten or twelve large sooty patches. Hind wing rosy wood-brown, with a black margin 3·5 mm. wide, a subbasal and a post-cellular sooty patch.

Length of fore wing 17 mm.

*Hab.* Bou Saada, May 1911 (*Victor Faroult*); 1 ♂.

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## XXIII.—*Two new Lepidoptera from New Guinea.*

By the Hon. Walter Rothschild, Ph.D.

### Family **Lycænidæ**.

1. *Deudoryx meeki*, sp. n.

♀. Legs orange-brown; palpi and frons chestnut, both edged with dark yellow; vertex chestnut; antennæ dark brown, ringed with buff, club chestnut; thorax and abdomen sooty brown-black. Fore wing above deep shining purple, disc in some lights blackish; basal third of costal area sooty brown-black. Hind wing above shining deep purple, costal area broadly sooty brown-black; abdominal area very broadly sooty grey-black, clothed with long hairs and edged with grey; anal angle produced, a chestnut patch on it fringed with long, black, battledore-like scales. Fore wing below costal half reddish chocolate, powdered with rosy scales; posterior half greyish wood-brown; a glittering green-golden patch at base of costal area; a large and two small green-golden patches in cell and a very large green-golden patch at

apex of cell reaching far beyond it; beyond this patch again are two green-golden dots. Hind wing below reddish chocolate, powdered with pink scales on outer third; an irregular, broad, oblique band of glittering green-gold reaches from upper half of base of wing three-fourths across the wing towards anal angle; two green-gold patches beyond this band on and above vein 8; two black spots bordered with metallic opal blue, beyond which is a chestnut patch at anal angle; a submarginal metallic opal blue line from vein 1 to vein 3.

Length of fore wing 24 mm.

*Hab.* Oetakwa River, Snow Mts., Dutch New Guinea, up to 3000 feet, Oct.–Dec. 1910 (*A. S. Meek*); a small series.

## Family **Sphingidæ.**

### 2. *Panacra excellens*, sp. n.

♂. Pectus brownish buff; fore legs, coxæ brownish pink washed with olive, rest pale pink; middle legs olive, a pink line on outside of tibiæ; hind legs, coxæ brownish pink, tibiæ pale olive, outside whitish, tarsi brown; palpi, lower half pale pink, upper half dark olive-green; head dark olive-green; antennæ pink; thorax dark olive-green, a central band black anteriorly, orange posteriorly, patagia edged outwardly with pink; abdomen buffish grey, dorsally first segment olive mixed with pink hairs, rest pale brownish olive edged with orange-yellow. Fore wing dark olive-green; a yellowish-pink patch, broken into three at base by black patches; a central transverse pale pink band, edged outwardly with orange-pink; apical third between vein 4 and termen pinkish silvery grey, sparsely powdered with olive scales and with an olive wedge-like subterminal patch between vein 7 and costa and four submarginal olive dots above veins 4, 5, 6, and 7, and zigzag olive line near basal end of pale area. Hind wing: basal two-thirds orange-yellow, marginal third sooty black tinged with pale brown; an indistinct pinkish patch near anal angle; abdominal area broadly buffish wood-brown, suffused with pale olive. Underside of abdomen pale pink.

Length of fore wing 35 mm.

*Hab.* Oetakwa River, Snow Mts., Dutch New Guinea, up to 3000 feet, Oct.–Dec. 1910 (*A. S. Meek*); 1 ♂.

XXIV.—*A new Madagascar Arctiid.*
By the Hon. Walter Rothschild, Ph.D.

*Rhodogastria saalmuelleri*, sp. n.

♂. Similar to *baueri*, but smaller, and the ground-colour more pinkish, less yellow. Pectus whitish; legs crimson-scarlet outside, clayish grey-white inside; antennæ chestnut; head and thorax pinkish ligneous buff; palpi scarlet, with black rings; a black dot on frons, one on vertex, one on each tegula, one at base of both patagia, three pairs on thorax; abdomen crimson. Fore wing yellowish pinky ligneous clay-colour; disc hyaline, dusted with clayish scales on basal two-thirds; nervures and discocellular patch of ground-colour of wing, outer edge of vitreous disc narrowly margined with dark brown. Hind wing hyaline, clothed with sparse clay hairs and a brownish discocellular patch.

Length of fore wing 25 mm.

*Hab.* Morondava, Madagascar; 3 ♂ ♂.

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XXV.—*Notes from the Entomological Department of the London School of Tropical Medicine.*—No. III. *Oriental Species of* Stomoxys. By Sophia L. M. Summers, M.A., B.Sc.

A collection of about three hundred specimens of *Stomoxys* was kindly sent to the London School of Tropical Medicine by Mr. H. C. Pratt from Kuala Lumpur.

There are five species in this collection, but only one of them is new. These flies were no doubt collected indiscriminately, so it is interesting to note the numbers of the different species. The most numerous seem to be *Stomoxys calcitrans*, Linné, and *Stomoxys oblongopunctata*, Brunetti. There are nearly one hundred of each of these. The next in number is *Stomoxys nigra*, Macq.; of these there are over forty. There are about forty specimens of the new species *Stomoxys pratti*, but of *Stomoxys limbata*, Austen, there are only eleven specimens. There are male and female in every species.

The species of *Stomoxys* are difficult to recognize. So much depends on the way the light is shining on them, and they seem to vary so much in the different lights, that it is

difficult to get a suitable basis for a table. In going over this collection I have found that the characters most to be relied on are :—(1) the width of the frons in relation to the width of the head, (2) the width of the median line on the thorax, and (3) the colour of the legs. The abdominal markings can be relied on to a certain extent only. In *Stomoxys calcitrans* the spots on the abdomen may vary considerably, but the species can be easily recognized by the broad frons, the narrow stripe on the thorax, and the black legs.

Since the determination of the species depends to a large extent on the breadth of the front and of the median stripe on the thorax, it is imperative to get exact measurements. I find that I can get these measurements exactly by making a camera lucida tracing of the head and thorax of the specimen, using a two-inch lens, and then measuring the drawing. The measurements of the front in this paper are taken at the vertex. The colouring of the face is not constant, and therefore cannot be used as a definite character. In some species the colour of the tibiæ may vary ; *e. g.*, in *Stomoxys nigra* I have found four with quite brown tibiæ (in the second pair of legs). These four agree with the type of *St. nigra* in every other respect, and the light colour of the tibiæ of the second pair of legs is not sufficient to make a new species of these specimens. Besides, Grünberg, in his description of *Stomoxys glauca*, which has since been shown to be a synonym of *Stomoxys nigra*, Macq. (Austen), remarks that sometimes the tibiæ are *quite brown* (Grün. 1907, 'Die blutsaugenden Dipteren').

In his revision of the Oriental blood-sucking Muscidæ (Records of Ind. Mus. vol. iv. no. iv. 1910) Mr. Brunetti gives a table of the Oriental species of *Stomoxys*, but I find he does not include *Stomoxys nigra*.

The following table is drawn up according to the characters aforementioned :—

*Table of Oriental Species of* Stomoxys.

A. Legs mainly black ..... 1.
B. Legs mainly brown ..... 2.

1. Legs mainly black.

1. Front in ♂ wide, $\frac{1}{4}$ or $\frac{1}{5}$ width of head .. 3.
   Front in ♂ narrow, $\frac{1}{6}$ or less width of head.
   Abdomen with round spots ..... *sitiens*, Rond., ♂.
3. Dorsal stripe on thorax narrow (·3–·5 mm.) at anterior end, widening towards the posterior end. Abdomen spotted .... 4.

Dorsal stripe on thorax wide (·75 mm.), uniform in width. Abdomen banded. *nigra*, Macq.
4. Spots round ..... *calcitrans*, Linné.
Spots triangular, apex pointing edge of segment ..... *triangularis*, Brunetti.
Spots elongate ..... *oblongopunctata*, Brunetti.

2. Legs mainly brown.

2. Front wide, $\frac{1}{4}$ or $\frac{1}{5}$ width of head ..... 5.
Front narrow, $\frac{1}{6}$ to $\frac{1}{8}$ width of head .... 6.
5. Abdomen distinctly banded ..... 7.
Abdomen blotchy. Dark species. Fore tarsus in ♂ with first joint fringed on the inside with a row of hairs of equal length. (♀ unknown.) ..... *pulla*, Austen.
7. Hind border of first three abdominal segments with black band. Femora clove-brown, hind tibiæ ochraceous buff, front and middle tibiæ and tarsi mummy-brown. Width of front $\frac{1}{3}$ in ♂, almost $\frac{1}{4}$ in ♀. Front in ♂ constricted in the middle ..... *limbata*, Austen.
Dorsum of second abdominal segment entirely clove-brown, deep posterior transverse band on third segment. Front and middle tarsi pale brown, width of front wider than $\frac{1}{4}$ width of head ..... *pusilla*, Austen.
6. Front $\frac{1}{6}$ in ♂, more than $\frac{1}{3}$ in ♀. Femora dark brown, tibiæ and tarsi very pale yellow. Abdomen seen from behind at a very low level is banded ..... *pratti*, sp. n.
Front $\frac{1}{5}$ in ♂. Interocular space very straight. Legs testaceous; coxæ black, femora brownish, anterior ones lighter on inner side, darker on outer side. Abdomen banded ..... *indica*, Pic.

Mr. Brunetti includes *Stomoxys plurinotata*, Bigot, *Stomoxys dacnusa*, Speis., and *Stomoxys bengalensis* in his table, but I have omitted them. He gives as the differences between *St. plurinotata*, Bigot, and *St. calcitrans*, Linné, the following :—"Thorax with 4 oblong large spots, each more or less divided. Width of frons (*presumably*) neither $\frac{1}{4}$ nor $\frac{1}{3}$ as sex is doubtful." Bigot, in his description of the species, said that sometimes these four spots appeared as four longitudinal stripes. In these cases, there being no measurements given, it could not definitely be said to differ from *St. calcitrans*, so it is probably safer to leave it out of the table. *Stomoxys dacnusa* Speis., requires, I think, a fuller description before it can be placed in a table. This species was founded on a damaged female specimen. *St. bengalensis*,

Pic., is probably a synonym of *St. nigra*, Macq.; its description corresponds to the type of *St. nigra*, and also with Grünberg's description of *St. glauca* (synonym of *St. nigra*, Macq. (Austen)).

The flies of this genus are medium-sized. The largest species in this collection is *Stomoxys nigra*, which measures 7·5 mm.; the smallest species is *Stomoxys limbata*, measuring a little under 5 mm.

*Geographical distribution.*—*Stomoxys calcitrans* has a very wide distribution; it is found wherever mankind is. It is so variable that it has been described at least twenty-one times as a new species. *Stomoxys sitiens*, Ron., is a doubtful Oriental species (*Brunetti*); Rondani reported it from Abyssinia. *Stomoxys nigra* has been found in Port Natal (*Macq.*), Cameroons and Togo (*Grünberg*). *Stomoxys triangularis* from South India (*Brunetti*). *Stomoxys oblongopunctata* from Assam (*Brunetti*). *Stomoxys pulla* is reported from India (*Austen*). *Stomoxys limbata* from India, Assam, and Ceylon. *Stomoxys pusilla* is also from India, while *Stomoxys indica* has been met with in India, Assam, and Ceylon.

*Stomoxys pratti*, sp. n.

♂. Length almost 7 mm.; width of front narrow, $\frac{1}{6}$ width of the head. Width of median stripe on the thorax ·5 mm. Front not straight.

Rather a dark species. The front is very little wider than the frontal stripe. The face and antennæ are greyish brown.

*Thorax* has the usual longitudinal stripes in front of the transverse suture, and, if viewed from behind at a low angle, they can be traced to the middle of the thorax. They can be seen still more distinctly if the head is turned away from the light.

*Abdomen* viewed from above is dark brown; from behind at a low angle the last segment is grey, while the other segments have broad posterior bands.

*Legs.* The femora are cinnamon-brown, the tibiæ and tarsi are a pale brownish yellow.

*Wings* are dirty brown.

♀. Length 6 mm.; width of front $\frac{1}{3}$ the width of the head. Similar to the male, except that the tibiæ and tarsi of the legs are a very pale yellow and the femora of the last pair are black-brown.

This species is near *St. brunnipes* (an African species, Grünberg, 1906, Zool. Anz. Bd. xxx. p. 89), but differs in

the following points:—In the male of *St. brunnipes* the width of the front is narrower than in *St. pratti*, being only $\frac{1}{8}$ width of head, while *St. pratti* is $\frac{1}{6}$; the antennæare black, but in *St. pratti* they are greyish brown. The black stripes on the thorax converge in front of the transverse suture, whereas in the new species they are parallel. The coxæ, trochanters, and femora are black in *Stomoxys brunnipes*, but are cinnamon-brown in *Stomoxys pratti*.

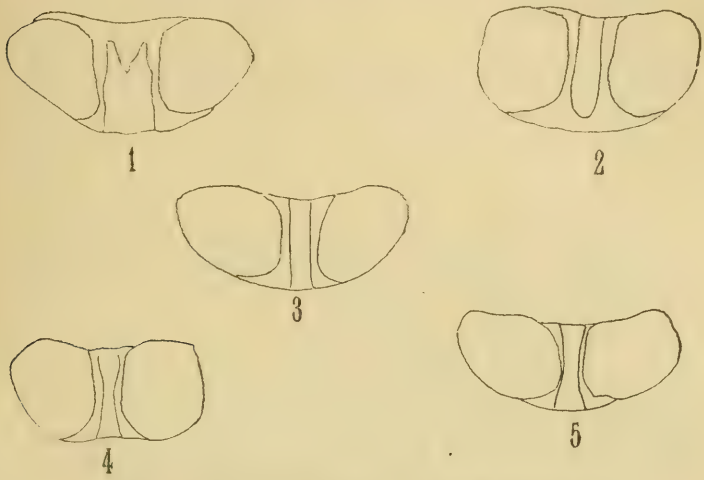



Fig. 1.—*Stomoxys calcitrans*, Linné. Head of male.
Fig. 2.—*S. oblongopunctata*, Brun. „ „
Fig. 3.—*S. nigra*, Macq. „ „
Fig. 4.—*S. limbata*, Austen. „ „
Fig. 5.—*S. pratti*, sp. n. „ „

In the female of *Stomoxys brunnipes* the broad black stripes on the thorax are nearly confluent. The abdomen is a shiny black, and when viewed from behind spots become visible on the second and third segments; in *Stomoxys pratti* the abdomen is dark brown and when viewed from behind is banded. Coxæ, trochanters, and femora are black, whereas in *Stomoxys pratti* they are light brown, except the last pair, which are dark brown.

It is also near *Stomoxys tæniatus* (Bigot, 1887, Bull. Soc. Zool. Fr.), but *Stomoxys tæniatus* is much larger, being $7\frac{1}{2}$ mm. in length. The front of the male of *Stomoxys tæniatus* is wider than that of *Stomoxys pratti*, and the legs are all a uniform pale yellow.

The types have been presented to the British Museum.

*Literature dealing with Oriental Species of Stomoxys.*

Linné. 1761. Fauna Suec. ed. ii. p. 467.
Macquart. 1850. Dipt. Exot. Suppl. 4, p. 239.
Rondani. 1873. Ann. Mus. Genova, vol. iv. p.
Bigot. 1887. Bull. Zool. Soc. Fr. tom. xii. p. 59.
Grünberg. 1906. Zool. Anz. Bd. xxx. p. 88.
——. 1907. Die blutsaugenden Dipteren, p. 157.
Picard. 1908. Bull. Soc. Ent. Fr. p. 20.
Austen. 1909. Ann. & Mag. Nat. Hist. (8) iii. p. 292.
Brunetti. 1910. Records of Ind. Mus. vol. iv. no. iv. p. 66.

My best thanks are due to Lt.-Col. Alcock, I.M.S., F.R.S., C.I.E., &c., and Mr. Austen, of the British Museum, for their great help in preparing this paper.

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## XXVI.—*Remarks on the Classification of the* Culicidæ, *with particular reference to the Constitution of the Genus* Anopheles.

By A. Alcock, C.I.E., M.B., LL.D., F.R.S., Lt.-Colonel I.M.S. (retired).

Before the great discovery of Ross attracted attention to mosquitoes no one questioned the propriety of grouping the Culicidæ in two subfamilies—namely, (1) Corethrinæ, in which the proboscis is short and soft and the veins of the wings are clothed with ordinary hairs; and (2) Culicinæ, in which the proboscis is long and stiff (and the mouth-parts in the female are formed for piercing) and the veins of the wings are clothed with scales.

Some recent writers, however, ignoring all the common features that distinguish these two groups from other Nematocerous Diptera, and exaggerating the importance of the functionally different mouth-parts of the female Culicinæ, have cut the Corethrinæ adrift, and have given the exclusive possession of the common family title to the Culicinæ. Such a proceeding seems to me to defeat the humane objects of a zoological classification, which are to draw tight and to knit together the morphological bonds that should unite diversely modified relatives. Even when the most is made of the difference between the larva of *Culex* and the larva of *Corethra*, there still remains the fact that the larva of *Mochlonyx* (whose adult is indisputably Corethrine) possesses the structural peculiarities of the larva both of *Corethra* and of *Culex*, besides exhibiting, in its four clypeal bristles, one of the peculiarities of the larva of *Anopheles*.

Recent writers, again, having exalted the Culicinæ to the rank of a family, have been obliged to magnify the importance of the often trivial characters that distinguish its component species, and have finished by dividing this most homogeneous little group of insects into no less than ten "subfamilies." It is unfortunate that one of the most adventurous of these separatists is Mr. Theobald, who has otherwise done such good service by demonstrating the taxonomic value of the scales that clothe the several regions of the body in this family.

It seems pertinent to nature, and also convenient for purposes of identification of species, to adhere to the old grouping of the family Culicidæ into two subfamilies—Corethrinæ and Culicinæ—and to divide the Culicinæ into four sections, as follows :—

Section 1. Megalorhini = Megarhininæ of Theobald.

Section 2. Epialurgi (ἠπίαλος = ague fever, and ἔργον = work), = Anophelinæ of Theobald.

Section 3. Culicales = Culicinæ, Heptaphlebomyinæ, Dinoceratinæ, Aedinæ, and Uranotæniinæ of Theobald.

Section 4. Metanototricha = Trichoprosoponinæ, Dendromyinæ, and Limatinæ of Theobald; this group being entirely conventional.

## Section 1. Megalorhini.

This section includes a small number of large mosquitoes in which the proboscis is bent downwards like a pothook and the body is clothed everywhere with flat strongly refracting scales. The second marginal cell of the wings is particularly small. The length of the palpi is variable in the female. The larva is large and has a breathing-tube. The species are found in the Neotropical, Ethiopian, Oriental, and Australian Regions.

## Section 2. Epialurgi.

This section includes the single genus *Anopheles*, with about 100 species, distributed in all the great zoogeographical regions.

The genus *Anopheles* may be characterized as follows :—

Head somewhat pyramidal, its predominant scales usually being loose-set and cuneiform or narrowly flabelliform ("upright forked scales" of Theobald). Palpi about as long

as the proboscis in both sexes, clubbed in the male. Proboscis of the usual form.

Scutum clothed either with hairs or with scales, which seldom form a dense coat. Scutellum with the free edge simply convex. Metanotum glabrous.

Abdomen clothed either with sparse hairs or with scales and hairs, the scales (when present) being often localized and inconspicuous, but sometimes conspicuous and fairly abundant.

Wings as a rule, to which, however, there are *numerous* exceptions, spotted.

In repose the body of the insect is, as a rule, inclined at an angle with the surface of rest.

The larva has no breathing-tube and is provided with two latero-dorsal series of fan-like tufts of scales on a varying number of the abdominal segments.

For the sake of convenience the species that compose the genus may be grouped in subgenera according to the following table; but the groups, though they can be defined with sufficient precision, grade into one another:—

*Synopsis of Subgenera of* Anopheles.

A. The covering of the scutum consists mainly either of hairs or of narrow falculate scales. (In any doubtful case the palpi are slender, *i. e.* not shaggy with outstanding scales.) ..... = 1.

B. The covering of the scutum consists mainly of broadish elliptical, commonly recumbent scales = 2.

1. Abdomen either without scales or with some inconspicuous narrow scales on the genital lobes and terminal segment, or with a tuft of scales on the ventral surface of the penultimate segment ..... = 3.
   Abdomen with an outstanding tuft of stiff and slender scales of extraordinary length on either side of every segment ..... = *Christya*.
   Abdomen with broad and very conspicuous scales on several segments, some of the scales sometimes forming regular and outstanding tufts .. = *Arribalzagia*.

3. Wings either not spotted at all or having a few dark spots formed merely by clumps of scales, or if "variegated" then there are not more than two distinctly formed colour-spots on the anterior edge. (In ambiguous cases, *e. g.* where a spot at the tip of the wing might be reckoned as anterior, then the palpi are shaggy.) ..... = 4.
   Wings usually much spotted in contrasted colours, their anterior edge barred or branded with numerous alternate dark and light spots or streaks. (In any ambiguous case the palpi are not shaggy.) Inconspicuous scales occasionally present on the terminal abdominal segment and genital lobes.. = *Myzomyia*.

4. No scales on the abdomen (very rarely there may be a few scattered and inconspicuous scales on the genital lobes) ..... = *Anopheles.*
   Abdominal scales present, usually as a small outstanding tuft on the ventral surface of the penultimate segment, rarely as a uniform covering to the terminal segment ..... = *Myzorhynchus.*

2. The predominant scales of the head are of the "upright forked" kind (cuneiform) ..... = *Nyssorhynchus.*
   The predominant scales of the head are not "upright forked" ..... = *Chagasia.*

The species of *Myzomia* may be arranged in two intergraduating series as follows:—

*a.* The covering of the scutum consists mainly of hairs ..... = *Myzomyia.*
*b.* The covering of the scutum consists mainly of falculate scales ..... = "*Pyretophorus.*"

The species of *Nyssorhynchus* may be arranged in three fairly distinct series as follows:—

*a.* Abdominal scales present on a few of the distal segments ..... = *Nyssorhynchus.*
*b.* Abdominal scales scattered on all the segments.. = "*Neocellia.*"
*c.* Abdominal scales fairly abundant on all the segments, and also in outstanding tufts which may be either lateral or ventral..... = "*Cellia.*"

The following are not included in the foregoing synopsis or in the sequel:—

1. *Aldrichia error*, Theobald.—One specimen, from India, in the British Museum. As it stands it consists of the head, thorax, wings, and appendages of a *Myzomyia rossii*, Giles, to which the scaly dark-coloured abdomen of some other species of mosquito has been attached.

2. *Bironella gracilis*, Theobald. — Described from three males.

The subgenus *Anopheles* shades into *Myzorhynchus* through *Anopheles separatus*, Leicester, *Anopheles vestitipennis*, Dyar and Knab, and *Anopheles grabhamii*, Theobald; it also shades into *Myzomyia* through *Anopheles gigas*, Giles, and *Anopheles wellcomei*, Theobald, and perhaps into *Pyretophorus* through *Anopheles atratus*, Skuse.

The subgenus *Christya* is essentially similar to *Myzorhynchus.*

The subgenus *Arribalzagia* is also essentially similar to *Myzorhynchus*, and shades into *Anopheles* through *Anopheles grabhamii*, Theobald, and *Anopheles vestitipennis*, Dyar and Knab.

The two series which constitute the subgenus *Myzomyia* show the transition from such forms as *Anopheles gigas*, Giles, and *Anopheles wellcomei*, Theobald, to *Nyssorhynchus*. The species known as "*Pyretophorus*" *costalis* is about as nearly intermediate between *Myzomyia* and *Nyssorhynchus*, in all respects, as can be imagined; and the significance of its position is enhanced by the fact that it is a variable species, some individuals leaning more towards *Myzomyia*, and others more towards *Nyssorhynchus*.

All these considerations justify the conclusion that the so-called "genera" of the proposed "subfamily" Anophelinæ cannot be separately focussed as distinct generic conceptions, but must all be merged in one generalization.

*a.* Subgenus Anopheles, Meigen.

(Including *Anopheles* and *Stethomyia* and *Cyclolepidopteron grabhamii* of Theobald's Monograph, and *Neostethopheles* and *Patagiamyia* of James.)

There may be some narrow scales on the pronotum and front of the scutum (or even, in one species, in the field of the scutum), but the vestiture of the scutum consists mainly of hairs, which are sparse. There may, very rarely indeed, be a few narrow and inconspicuous scales on the genital lobes, but the vestiture of the abdomen also consists of sparse hairs. The wings are either unspotted or have a few dark spots formed by clumps of scales, or they may have a few colour spots, in which case not more than two of these—distinctly formed—are present on the anterior costal edge. The wing-scales are usually, but not always, long and narrow. The palpi are usually slender.

The subgenus is represented in all the great zoogeographical regions, though it only just enters the Ethiopian region.

*b.* Subgenus Myzorhynchus, Blanchard.

(Including *Myzorhynchus* and *Lophoscelomyia* of Theobald's Monograph.)

There are no true scales in the field of the scutum, though there may be some on its front edge and on the pronotum. Abdominal scales are restricted to a single outstanding tuft on the ventral surface of the penultimate segment, except in

one species (="*Lophoscelomyia*"), in which the terminal segment and genital lobes are covered with narrow scales. Wings very dark, though not without spots; their front edge never has more than two spots (exclusive of a spot which may be present in the fringe at the tip of the wing), which are usually small. Wing-scales usually rather broadly elliptical. Palpi always shaggy with scales.

One species is Palæarctic and one is Australian; the others are Oriental and Ethiopian.

*c.* Subgenus Christya, Theobald.

Differs from *Myzorhynchus* chiefly in having an outstanding wisp of stiff, slender, extremely long scales on either side of every segment of the abdomen. In addition to these peculiar lateral scales there are some ordinary narrow scales on the genital lobes and last segment of the abdomen.

One species, found in Eastern Africa.

*d.* Subgenus Arribalzagia, Theobald.

(Including *Arribalzagia*, *Manguinhosia*, *Kerteszia*, and part of *Cyclolepidopteron* of Theobald's Monograph.)

There may be some narrow scales on the pronotum and front of the scutum, but the vestiture of the scutum consists mainly of hairs. Conspicuous broad scales are present (scattered) on some or all of the segments of the abdomen, and often stand out as prominent tufts or broken bands. The wings, though spotted, have a dark cast, owing to predominance of blackish scales, and in several of the species there are large black spots on the front edge, the colour of which, though mainly due to broad scales, is partly due to staining of the wing-membrane itself. Wing-scales broad. Palpi shaggy with scales.

Restricted to the Neotropical region.

*e.* Subgenus Myzomyia, Blanchard.

(Including *Myzomyia*, *Feltinella*, *Neomyzomyia*, and *Pyretophorus* of Theobald's Monograph, and *Nyssomyzomyia* of James.)

There may be some distinct scales on the pronotum and adjacent part of the scutum, but the main vestiture of the scutum consists of hairs or of narrow scales. There may be a few narrow scales on the genital lobes, or even—few, scattered, and inconspicuous—on the terminal segment of the abdomen, but the main vestiture of the abdomen consists of hairs. The wings are almost always profusely spotted, and

the anterior costa is barred with numerous alternate dark and light spots or streaks. Wing-scales almost always narrow. Palpi usually slender.

Chiefly Ethiopian and Oriental, but also represented in the Palæarctic and perhaps in the Neotropical regions.

*a*. In the ordinary *Myzomyia* series the vestiture of the scutum consists mainly of hairs or hair-like scales.

*b*. In the "*Pyretophorus*" series the vestiture of the scutum consists mainly of narrow falculate scales.

*f*. Subgenus Nyssorhynchus, Blanchard.

(Including *Nyssorhynchus*, *Neocellia*, and *Cellia* of Theobald's Monograph, *Calvertina* of Ludlow, and *Christophersia* of James.)

The scutum is fairly well covered with short, more or less recumbent, elliptical scales of considerable breadth, which cannot be confused with hairs. Narrow scales are also almost always present on more or less of the abdomen. The wings, though they have a dark cast, are much speckled, and there are always numerous spots on the costa. Wing-scales rather broad. Palpi shaggy. It is very common for the legs to be profusely speckled or finely barred with white, and for some of the tarsal segments of the hind legs to be white.

Ethiopian, Oriental, Australian, and Neotropical; one species enters the confines of the Palæarctic region.

*a*. In the ordinary *Nyssorhynchus* series there are no scales on the anterior abdominal segments and no outstanding tufts of scales.

*b*. In the "*Neocellia*" series there are scales on the dorsal surface of all the abdominal segments (though they are often very sparse on the anterior segments) and no outstanding tufts of scales.

*c*. In the "*Cellia*" series all the abdominal segments are fairly well clothed with scales, and in addition there are outstanding tufts of scales, which may be either lateral or ventral.

*g*. Subgenus Chagasia, Cruz.

(Including *Chagasia*, Cruz, and *Myzorhynchella*, Theobald.)

The scutum is covered with distinct more or less recumbent scales of considerable breadth. The vestiture of the abdomen consists of hairs, but there may be some narrow and inconspicuous scales on the genital lobes. The wings have a dark cast, though they may be spotted; the wing-scales are of considerable breadth. The palpi are shaggy with scales and

the legs are either profusely barred or have some of the tarsal segments white. Some of the antennal segments may have more or less conspicuous whorls of scales. On the head broad, somewhat procumbent scales, which are not "forked," predominate, and it is chiefly this character that separates the subgenus from *Nyssorhynchus*.

Restricted to the Neotropical region.

### Section 3. Culicales.

The species of this section are distinguished from *Epialurgi* by having the posterior edge of the scutellum trilobed, from *Megalorhini* by not having the proboscis bent like a pothook, and from *Metanototricha* by not having any scales or bristles on the metanotum.

The scaly covering of the head shows much diversity. The scutum, scutellum, and abdomen are always thickly covered with scales. The relative length of the palpi is very variable; all gradations can be found, in both sexes, between palpi which are long and palpi which are short.

The wings in the majority of species are not spotted; but there are numerous species in which they are speckled, not a few in which they are mottled, and there are some in which they are spotted like those of some of the species of *Anopheles* (subgenus) or beautifully dappled like those of a *Myzomyia* or *Nyssorhynchus*.

The larva has a breathing-tube of varying length.

Some recent systematists have broken the *Culicales* in pieces like a potter's vessel, and have multiplied genera by methods which resemble those of Procrustes. Taking these proposed genera as they stand, they can be segregated into seven groups, principally according to the characters of the scales of the head, scutellum, and wings—characters the import of which Mr. Theobald was the first to notice.

a. *Genera of the* Culex *type*.—Three kinds of scales are found on the head, namely loose-set, falculate, and cuneiform scales on the crown and flat overlapping squames on the cheeks. The scales of the scutellum are usually falculate, but squames may be present or may even predominate. The wing-scales are usually long and narrow, but may be elliptical or narrowly spathulate. In a few species the wings are spotted by clumps of scales or are even spotted in contrasted colours. The palpi of the female are very short, those of the male are almost always longer than the proboscis.

The genus *Heptaphlebomyia*, Theobald, which has been proposed as the representative of a distinct subfamily, seems to me to be merely a *Culex* with a few inconstant scales on the so-called seventh longitudinal vein—a vein that exists in many species of mosquitoes.

The genus *Dinocerites*, Theobald, which has also been proposed as a representative of a distinct subfamily, also seems to me to be a slightly modified *Culex*. The antennæ are of extraordinary length in both sexes, and the insect is said to have the habit of breeding in the brackish water that collects in the burrows of crabs. This habit may possibly explain the length of the antennæ, which, like the elongated antennæ of certain insects that inhabit dark caves, and the exceedingly long streamers of certain fishes that live in the sunless depths of the ocean, may be an adaptation to conditions where eyesight is of no avail. That *Dinocerites* also has well-developed eyes does not invalidate this suggestion, since the insect is not said to spend the whole of its existence in dark crab-burrows.

b. *Genera of the* Stegomyia *type*.—Though some loose cuneiform scales are usually to be found on the nape, and though a few localized falculate scales may exist on the head and scutellum, the predominant—sometimes the only—scales of both these regions are flat overlapping squames that impart a very smooth appearance. The wings are never spotted, and their scales are slender and stiff-looking. The palpi, as a rule, are long in the male and quite short in the female, but they may be decidedly shorter than the proboscis in the male (*e. g.* in *Hylecœtomyia*), or as much as two-thirds the length of the proboscis in the female (*e. g.* in *Brevirhynchus* and in a species of *Leicesteria*), or quite short in both sexes (*e. g.* in *Harpagomyia*).

c. *Genera of the* Aedes *type*.—Though there may be some localized cuneiform and falculate scales on the head, the predominant scales are flat overlapping squames, as in *Stegomyia*. The scales of the scutellum are entirely falculate. The palpi may be quite short in both sexes (*e. g.* in *Aedes*), or short in the female and about two-thirds the length of the proboscis in the male (*e. g.* in *Mimomyia*), or short in the female and as long as the proboscis in the male (*e. g.* in *Pseudoskusea*).

d. *Genera of the* Uranotænia *type*.—The predominant—sometimes the only—scales of the head and scutellum are

flat overlapping squames. The scales of the scutum are often broadly elliptical. As a rule some of the wing-scales are broad triangular plates. The second marginal cell of the wing is very small. Palpi very short in both sexes. Small or minute insects, commonly with beautiful blue markings.

e. *Genera of the* Psorophora *type.* — The predominant scales of head, scutum, and scutellum are elliptical squames, which may be either flat or curved and are often rather distant. In those forms where both sexes are known the palpi are short in the female and long in the male.

f. *Genera of the* Mucidus *type.*—The head is shaggy with upstanding scales of several kinds, among which either coarse falcate scales or broad cuneiform or flabelliform scales are conspicuous. The wings are speckled or mottled, or they may be spotted—in field, costa, and fringe—like those of a *Nyssorhynchus.* The legs also are, as a rule, much banded or brindled. The wing-scales are either broadly foliaceous or broadly subtriangular. The palpi may be quite short in both sexes, or nearly as long as the proboscis in both sexes, or long in the male and short in the female. The mosquitoes of this group seem to link the *Culicales* with the *Epialurgi.* The following forms belong to this group:—*Mucidus*, Theobald (=*Lepidoplatys*, Coquillett); *Mansonia*, Blanchard (=*Pneumaculex*, Dyar); *Mansonioides*, Theobald; *Etorilepidomyia*, Theobald; *Orthopodomyia*, Theobald; *Newsteadina*, Theobald; *Aedimyia*, Theobald; *Finlaya*, Theobald.

g. *Annectant forms between* Culex *and* Stegomyia—in which the squames of the cheeks, which in *Culex* are not visible in a dorsal view, extend more or less on to the crown of the head, and do not lie flat as in *Stegomyia*, though they overlap, and in which the scales of the scutellum are either exclusively falculate as in *Culex* or are combined with overlapping squames. *Acartomyia*, Theobald, may be taken as a standard, and all the seven "genera"—each of which rests on a single species—that can be collected into this group might be united.

## Section 4. Metanototricha.

The species included in this small section resemble *Culicales*, particularly those of the *Stegomyia* and *Aedes* groups, but are distinguished by having a few inconspicuous bristles or scales (or both bristles and scales) on the metanotum.

The head and scutellum, and usually the scutum also, are covered with flat squames, which are often refulgent or iridescent. The palpi may be short in both sexes or short in the female only.

The species are most abundant in the Neotropical region, but also occur in the Ethiopian and Oriental regions and in the outskirts of the Australian region.

In conclusion, I have to thank Messrs. Austen and Edwards, of the British Museum staff, for the liberty they have given me to examine the collections in their charge and for the many ways in which they have obliged me when I required assistance.

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## XXVII.—*New Rodents from S. America.*

By Oldfield Thomas.

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*Œcomys superans*, sp. n.

A very large species with grey belly.

Size considerably larger than in any hitherto described *Œcomys*.

Fur soft and woolly, but not very long; hairs of back about 8–9 mm. in length. Ground-colour above greyish rufous, the hairs dark greyish with russet tips; flanks clearer russet. Under surface pale grey (grey no. 3), the hairs slaty basally, whitish terminally. Ears rather short, brown. Hands with a narrow darker line down the metacarpus, sides and digits whitish. Feet broad, pale brown above; fifth hind toe reaching to the end of the first phalanx of the fourth; scutellation of upper surface of feet unusually distinct, the skin of both metatarsus and digits spotted with brown. Tail long, slender, finely scaled (15 rings to the cm.), thinly haired; brown above and below, or indistinctly mottled with whitish.

Skull with the large brain-case and shortened anterior zygomatic plate characteristic of *Œcomys*. Upper outline bowed. Ridges not heavily developed and not showing any indication of postorbital projections. Palatal foramina fairly large and open. Parapterygoid fossæ rather broad.

Molars large and heavy, the anterior end of the series slightly curved outwards.

Dimensions of the type (measured in the flesh) :—

Head and body 150 mm.; tail 199; hind foot 31; ear 17.

Skull: greatest length 37·3; condylo-incisive length 33·7; greatest breadth 18·7; nasals 13·8; interorbital breadth 6·2; breadth of brain-case 15; palatilar length 16; palatal foramina 6·3 × 3·2; upper molar series 6·2.

*Hab.* Canelos, Rio Bobonaza, Oriente of Ecuador. Alt. 2100′.

*Type.* Adult female. B.M. no. 11. 7. 19. 12. Original number 169. Collected 28th April, 1910, by M. G. Palmer.

This species has not the general appearance of the more typical members of *Œcomys*, but its broad feet with long fifth toe, large brain-case, and the reduction of its anterior zygomatic plate all indicate that it belongs to that group rather than to *Oryzomys*. In size, as judged by length of skull, it considerably exceeds any species as yet described.

*Œcomys palmeri*, sp. n.

Like *Œ. superans*, but smaller and darker-coloured.

Size about as in the other large species of the genus, decidedly smaller than in *Œ. superans*. Colour darker than in that animal, the upper surface sepia-brown, with only slight indications of buffy along the flanks. Under surface grey no. 9, the hairs slaty for their basal, whitish for their terminal halves. Hands and feet pale brown, the scutellations, as in *Œ. superans*, more conspicuous than in most species. Tail of medium length, thinly haired, very finely scaled (rings 19–20 to the c.m.), paler brown, indistinctly mottled with whitish.

Skull less bowed than in *superans*; ridges proportionally more developed; palatal foramina and parapterygoid fossæ narrower. Molars smaller, narrower, the series quite parallel, not curved out anteriorly.

Dimensions of the type (measured in flesh) :—

Head and body 131 mm.; tail 156; hind foot 30; ear 15.

Skull: greatest length 33·4; condylo-incisive length 30·3; greatest breadth 17; nasals 11·1; interorbital breadth 6; breadth of brain-case 14; palatilar length 15; palatal foramina 6·2 × 2·4; upper molar series 5·6.

*Hab.* Canelos, Oriente of Ecuador. Alt. 2100′.

*Type.* Adult male. B.M. no. 11. 7. 19. 13. Original number 170 A. Collected 28th April, 1910, by M. G. Palmer.

This species agrees in general characters with *Œ. superans*,

but its skull and teeth are so much smaller that it cannot be the same species.

*Proechimys iheringi*, sp. n.

Allied to *P. albispinus*, Geoff.

Size rather larger than in *P. albispinus*. Coat intermixed with spines throughout, quite to the base of the tail; spines of back about 20–22 mm. in length by $\frac{1}{2}$ mm. broad, pale greyish basally, with black tips, a certain number on the rump and flanks, as in *albispinus*, wholly white. General colour more rufous brown than in *albispinus*, but the type has been skinned out of spirit and may be somewhat discoloured. Under surface wholly white. Hands and feet white. Tail brown above, strongly contrasted white below.

Skull decidedly longer than that of *albispinus*. Muzzle and frontal region convex mesially instead of flat. Supraorbital ridges little developed, very much less than in *albispinus*, and not extending on to the parietals. Zygomata broad vertically, the ridge crossing their outer surface almost obsolete. Palatal foramina short, as in *albispinus*, their posterior lips less developed. Posterior palatal edge at level of middle of $m^2$. Hamular processes of medium breadth. Bullæ small and low.

Dimensions of the type (measured on a spirit-specimen before skinning) :—

Head and body 200 mm.; tail 183; hind foot 45; ear 24.

Skull: greatest length 53; condylo-incisive length 43; zygomatic breadth 27; nasals 20; interorbital breadth 12·3; palatilar length 18; palatal foramina 3·8; upper tooth-series 9.

*Hab.* Island of São Sebastião, off São Paulo, Brazil.

*Type.* Adult male. B.M. no. 2. 8. 25. 5. Presented by the São Paulo Museum through Dr. Hermann Ihering. Two specimens.

I had long supposed these specimens to be *albispinus*, described from Bahia, but a study of a series of that animal obtained by Mr. A. Robert at Lamarao, in that State, shows that the São Sebastião form is readily distinguishable by the cranial characters above detailed.

I have named this distinct species in honour of the sender of the specimens, Dr. H. von Ihering, Director of the São Paulo Museum, to whom science is indebted for much valuable work on the zoology of Brazil, and to whom also the British Museum owes many interesting specimens.

Particular attention may be directed to his recent admirable papers on the Carnivora of S. Brazil *.

*Proechimys gularis*, sp. n.

A dark-coloured species with a brown throat. No parietal ridges.

Size fairly large. Coat not excessively spinous, the spines practically restricted to the middle of the back, and in themselves both flexible and narrow, rarely exceeding half a millimetre in breadth; their tips continued into a fine bristle-hair. General colour above dark rufous brown (paler than "burnt umber," darker than "cinnamon-rufous"), the dorsal area blackened by the dark tips to the spines. Under surface white or whitish mesially, not sharply defined, but more or less mixed laterally with brownish (pale mars-brown); interramia and throat wholly brownish or buffy, the hairs either wholly pale brown, or brown with buffy tips. Hands and feet dark brown. Tail of medium hairiness, brown above, slightly lighter below.

Skull with long muzzle. Nasals reaching back about 3 mm. past the premaxillary processes, and reaching the level of the front of the orbits. Supraorbital ridges not excessively developed, and not, or very indistinctly, extending backwards across the parietals, in this respect markedly differing from the condition in *P. semispinosus*. Palatal foramina of medium length, not widely expanded, their posterior third with well-marked inturned lip. Posterior palatal edge sharply angular, its point opposite the front of $m^3$. Hamular processes spatulate, about 2 mm. in breadth. Bullæ rather small and low.

Dimensions of the type (measured in flesh) :—

Head and body 247 mm.; tail (estimated from other specimens) (c.) 160; hind foot (s. u.) 45; ear 21.

Skull: greatest length 61; condylo-incisive length 49·5; greatest breadth 28·5; nasals 23; interorbital breadth 13·3; palatilar length 21; palatal foramina 6·8; upper molar series (much worn) 9·4.

*Hab.* Canelos, Rio Bobonaza, Oriente of Ecuador. Alt. 2100′.

*Type.* Old male. B.M. no. 11. 7. 19. 15. Original number 182. Collected 22nd May, 1910, by Mervyn G. Palmer. Four specimens examined.

This well-marked species may be distinguished from all

* Revist. Mus. Paulista, viii. p. 148 (1910); Arch. f. Nat. 1910, i. p. 113.

others by its dark-coloured throat, the whitish belly colour usually running right up to the chin. Its nearest ally is probably *P. brevicauda*, Günth., with which it agrees in the suppression of the parietal ridges, but that animal has a buffy underside, nearly uniform from chin to anus, and its palatal foramina are shorter and have less developed posterior lips.

*Proechimys semispinosus calidior*, subsp. n.

A rufous lowland representative of true *semispinosus*.

Essential characters of true *semispinosus*, Tomes*, but the general colour dark rich rufous (nearest to "cinnamon-rufous"), heavily blackened on the dorsal area. Sides clearer cinnamon-rufous, varying in some specimens towards buffy. Under surface and inner side of limbs pure, sharply defined white. Hands and feet brown. Tail well haired, black above, whitish below.

Skull quite as in true *semispinosus*.

Dimensions of the type (measured in flesh) :—

Head and body 249 mm.; tail 168; hind foot 48; ear 26.

Skull: greatest length 58; condylo-incisive length 49; greatest breadth 28·5; nasals 22; interorbital breadth 13·6; palatilar length 20; palatal foramina 4·6; upper molar series 9.

*Hab.* San Javier, Lower Cachavi R., N.W. Ecuador. Alt. 60′.

*Type.* Adult female. B.M. no. 1. 3. 19. 30. Original number 10. Collected 6th May, 1900, by Messrs. Flemming and Miketta. Eight specimens.

*On Specimens referred to* Kerodon boliviensis, *Waterh.*

Putting aside the Argentine Cavies representing *Kerodon leucoblepharus*, Burm. (with range from Salta to Mendoza), the Bolivian and Peruvian specimens hitherto referred to Waterhouse's *K. boliviensis* appear to belong to three species, distinguishable largely by the sizes of their bullæ.

But the matter is complicated by the fact that among the original series of *boliviensis* received by the Museum from Mr. Bridges, more than one of these species appears to be represented, while in hardly any of them have the bullæ been preserved. Fortunately in one specimen a perfect bulla remains, and this example—no. 45. 11. 18. 22, skull 518 *a*—

* Type now in the Museum collection, no. 7. 1. 1. 173.

may be chosen as a "lectotype" to typify Waterhouse's species. *K. boliviensis* was said to have come from the "high tableland between Cochabamba and La Paz." Specimens which I now refer to the same animal were collected by Mr. P. O. Simons at Paratani, close to Cochabamba, and at other localities southwards to Sucre and Potosi. Externally the species is greyish with a slight yellowish suffusion, its belly being prominently whitish or creamy.

Secondly, we have a form from Sajama, greyish above, with scarcely any yellowish suffusion; the belly also grey, not conspicuously lighter than the upper surface. In this animal the bullæ are slightly larger than in true *boliviensis*, though the difference is not very great.

The skull of this Cavy agrees nearly with that figured by Meyen as "*Galea musteloides*" *, whose type locality is the pass leading from Tacna to Lake Titicaca, and by no means far from Sajama. The name *Kerodon musteloides* may therefore be accepted for the Sajama species.

Thirdly, on the shores of Lake Titicaca there is a species which may be described as follows :—

*Kerodon auceps*, sp. n.

General colour more yellowish than in the other forms, the upper surface mixed black and buffy. Hairs of back pale slaty, with a "cream-buff" subterminal ring and black tip. Under surface pale buffy or creamy, lighter than in *musteloides*, not so white as in *boliviensis*; the bases of the hairs pale slaty or "drab-grey." Ears longer than in the other allied species. Orbital rings dull buffy, the black eyelashes very thick and strong.

Skull broader and with more widely expanded zygomata than in *boliviensis* and *musteloides*; upper outline more bowed; bullæ much larger in every dimension. Mesopterygoid fossa fairly wide, its anterior border squarish or broadly rounded.

Dimensions of the type (measured in flesh) :—

Head and body 225 mm; hind foot 38; ear 25 †.

Skull: greatest length 54·5; condylo-incisive length 50; zygomatic breadth 33·5; nasals 20·6 × 8·3; interorbital breadth 11·7; palatilar length 25; greatest horizontal diameter of bullæ 15·3; upper molar series (crowns) 15·2.

*Hab.* Lake Titicaca. Type from Guarina (alt. 4000 m.),

* Nova Acta Ac. Nat. Cur. xvi. pt. ii. p. 597, pl. xlii. figs. 4–7 (1833).

† 21–22 in specimens of *boliviensis* measured by the same collector.

near the south-east, the Bolivian, end of the lake. Others from Achacoche in the same neighbourhood (*Simons*, 1900), Desaguadero River (*Pentland*, 1850), and Puno, at the western, Peruvian, end of the lake (*Kalinowski*, 1895).

*Type*. Adult female. B.M. no. 1. 1. 1. 91. Original number 1180. Collected 15th August, 1900, by Perry O. Simons. Presented by Oldfield Thomas. Ten specimens examined.

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## XXVIII.—*A new Termitophilous Millipede from Bengal.*

By S. Hirst.

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In an appendix to Prof. Escherich's interesting work on the natural history of the white ants of Ceylon * Prof. F. Silvestri describes a new genus of millipedes, *Termitodesmus* (forming a new subfamily (Termitodesminæ) of the order Limacomorpha), with two new species, *T. ceylonicus* and *T. escherichi*, both of which were found in nests of *Termes obscuriceps*, Wasm.

The present short note deals with a third species of this genus, discovered by Mr. H. Maxwell-Lefroy in the mounds of *Termes obesus*, Rawb., at Cuttack, Bengal. My best thanks are due to Mr. Maxwell-Lefroy for his kindness in allowing me to examine and describe this new millipede.



*Termitodesmus lefroyi*, sp. n.

Cream-coloured. Body elliptical-oval in shape and rather strongly convex dorsally; it is less than twice as long as

* 'Termitenleben aus Ceylon,' by Prof. K. Escherich (Jena: Gustav Fischer, 1911).

wide, the width equalling the united length (of the uncovered parts) of tergites 1–11. Posterior angle of the lateral margins of the tergites slightly produced; the uncovered part of them furnished with very numerous minute scales, which are circular in shape and are not in contact with one another; the greater part of the last tergite is concealed by the penultimate one. Outer part of the posterior edge of the pleural plates fringed with hair. Antennæ consisting of eight segments, all of which are very short, the distal one being very minute.

Length of body 4·25, its width 3 mm.

*Remarks.* This species can easily be distinguished from the two species already described by the shape of the body and of the scales of the uncovered part of the tergites.

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## XXIX.—*New West-African Rodents.*

By Guy Dollman.

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*Anomalurus imperator*, sp. n.

Related to *Anomalurus fraseri*, Waterh.; in general appearance rather similar to *A. fraseri nigrensis*, Thos., but without the dark ocular and occipital markings, and with shoulders and flanks strongly tinged with buff.

Size and general proportions as in *fraseri*. General colour of back olive-brown washed with buff, the buff tint most evident on the flanks, hind-quarters, and shoulders, in the latter region appearing as bright orange-buff-coloured areas. Hairs of back with slate-black bases and buffy subterminal rings; extreme tips brownish. Head and face ashy grey, the grey colour washed with buff on the posterior part of head. No dark markings on sides of face or around eyes. Dark hairs at base of ears brownish black, forming prominent tufts at insertion of ears, but not spreading on to the head as dark occipital markings such as occur in *A. f. nigrensis*. Sides of face ashy grey; hairs with greyish-white bases, darkening to pale brownish towards the tips, extreme tips yellowish white. Light buff-coloured areas on sides of neck, beneath ears, ill-defined, not nearly so prominent as in *nigrensis*. Backs of hands and feet dark brownish speckled with grey; claws clothed with long stiff

black hairs, those on the hind feet entirely covering the claws. Under surface of body white, faintly tinted with buff; hairs of belly white throughout. Hairs on throat pale grey tipped with buff. Chin ashy grey. Hairs on underside of interfemoral membrane dark brownish, strikingly different from the white hairs of *nigrensis*. Tail like that of *nigrensis*, basal half brownish speckled with buff, apical region brownish black. Caudal scales as in *fraseri* and allied forms.

The skull of the type is unfortunately badly injured in the nasal and maxillary regions. Cheek-teeth large and massive. Auditory bullæ exceptionally large and inflated.

Dimensions of the type (measured in the flesh) :—

Head and body 330 mm. ; tail 244 ; hind foot 60 ; ear 35.

Skull : zygomatic breadth 42 ; occipital breadth 25 ; interorbital breadth (anterior) 19 ; interorbital breadth (posterior) 16 ; postpalatal length 23·5 ; greatest diameter of auditory bullæ 14 ; length of upper cheek-teeth 13.

*Hab.* Bibianaha, 60 miles west of Kumasi, Gold Coast. Altitude 700 feet.

*Type.* Old female. B.M. no. 11. 6. 2. 8. Original number 80. Collected on March 7th, 1911, by Dr. H. G. F. Spurrell.

This handsome species is readily distinguished from the allied members of the genus by the entire absence of the black ocular and occipital markings. In addition, the bright buff-coloured tint on the back and shoulders renders this *Anomalurus* quite distinct from all the other members of the *fraseri* group.

Dr. Spurrell is to be congratulated on the discovery of this fine new species, the type of which he has presented, together with a number of other rare and interesting West-African mammals, to the British Museum.

*Cricetomys gambianus oliviæ*, subsp. n.

A pale-coloured form, closely related to *C. g. dichrurus*, Osg.

In size and general proportions rather larger than *dichrurus*. General colour of upper surface pale buffy grey, very much paler and lighter in colour than in the southern race. Flanks rather paler than back, gradually fading into the light greyish white of the ventral surface. Hairs of back with pale grey bases, the colour darkening towards the terminal halves ; tips buff-coloured or brownish. Interspersed are a number of long, rather harsh, black hairs,

evenly distributed over the whole dorsal surface. Backs of hands and feet brownish; toes clothed with whitish hairs. Ventral surface of body dirty white. Tail with terminal half white, in this respect agreeing with *C. g. dichrurus*.

Skull like that of *dichrurus* but rather larger. Posterior emargination of palate well marked. Auditory bullæ fairly large.

Dimensions of the type (measured in the flesh):—

Head and body 330 mm.; tail 373; hind foot 65; ear 40.

Skull: greatest length 67; basilar length 55; condylo-incisive length 63; zygomatic breadth 33·5; occipital breadth 25; length of nasals 26; palatilar length 33·4; length of palatal foramina 5·5; alveolar length of upper molar series.

*Hab.* Fika, Bornu, Northern Nigeria. Altitude 1100 feet.

*Type.* Adult male. B.M. no. 11. 5. 12. 9. Original number 35. Collected by P. A. Talbot, Esq., on March 3rd, 1911.

Three specimens of this new *Cricetomys* were collected by Mr. Talbot, and, together with several other mammals, presented by him to the British Museum. The collection was obtained during the journey which Mr. Talbot recently made across Nigeria, in company with Miss Olive MacLeod, and it is after Miss MacLeod that the novelty of the collection is named.

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## XXX.—*A new Spiny Mouse from Somaliland.*

By Guy Dollman.

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*Acomys brockmani*, sp. n.

Allied to *Acomys mullah*, Thos., but very much paler in colour and rather smaller in size.

Size and proportions rather less than in *A. mullah*. General colour of back pale yellowish brown, washed with a light rufous tint, the general effect about as represented in snuff-brown no. 1 washed with yellowish salmon no. 1 ('Répertoire de Couleurs'). Middle of back, in posterior region, slightly darker than rest of dorsal surface, due to the brown tips of the spines being rather richer in colour, but not approaching the dark brownish coloration met with in *A. mullah*. Face, head, and shoulders paler and less rufous

than back. Flanks pale reddish buff (yellowish salmon no. 1, 'Répertoire de Couleurs'), the general effect much paler and purer in colour than in *mullah*. Spines on flanks with white bases and pale reddish tips, no suggestion of the brownish tips such as occur in *mullah*. Sides of face and neck white, washed with pale brownish buff. Backs of hands and feet pure white. Ventral surface of body white. Tail similar to that of *A. mullah*, but lighter on the dorsal surface.

Skull smaller than in *A. mullah*; nasals and palatal foramina markedly shorter, cheek-teeth rather smaller.

Dimensions of the type (measured in the flesh) :—

Head and body 105 mm.; tail 105; hind foot 17; ear 18.

Skull: greatest length 30; basilar length 23; condylo-incisive length 26·6; zygomatic breadth 14·4; interorbital constriction 5; breadth of brain-case (across squamosal region) 12·6; greatest length of nasals 11·5; length of palatal foramina 7; width across palate (inside $m^1$) 3; length of upper molar series 4·5.

*Hab.* Bulhar, Somaliland. Altitude, coast.

*Type.* Adult male. Original number 319. Collected on December 23rd, 1910, by Dr. R. E. Drake-Brockman and presented by him to the British Museum.

The exceedingly pale colour of the dorsal surface of this new form at once distinguishes it from the allied species *A. mullah*, while the cranial differences, noted above, necessitate the two forms being considered specifically distinct. It is interesting to note that this new species appears to occur only on the coast, whereas *A. mullah* is confined to the interior, the type locality being Harrar.

In addition to the type, Dr. Drake-Brockman collected six further specimens of this *Acomys* at Bulhar, all agreeing in the pale coloration of the dorsal surface. It gives me great pleasure to name this new species after Dr. Drake-Brockman, who has already done so much to enlighten zoological science on the mammalian fauna of Somaliland and Abyssinia.

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## XXXI.—*Descriptions of new African Cyprinodont Fishes.*

By G. A. Boulenger, F.R.S.

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A revision I have recently made of the African Cyprinodonts has resulted in the establishment of several new species, some

of which are based on specimens which have been brought over alive for exhibition in aquariums, or which are of interest as destroyers of mosquito-larvæ ; it is therefore desirable to publish descriptions of them in anticipation of the forthcoming third volume of the British Museum Catalogue of Fresh-water Fishes, in which all the known species will be described and most of them figured.

I seize this opportunity to point out that the scales of the Cyprinodont described by me as *Haplochilus tanganicanus* are ctenoid ; this character and others justify the establishment of a new genus, for which *Mohanga,* one of the native names of the fish, is proposed. *Mohanga tanganicana* further differs from all other African Cyprinodonts in having the conical unequal-sized teeth forming a band which is exposed when the mouth is closed, as in the Atherinid genus *Rhombatractus*, and a larger anal fin with 28 to 30 rays.

*Fundulus gardneri.*

Depth or body 4 times in total length, length of head $3\frac{1}{3}$ to $3\frac{1}{2}$ times. Head flat above ; snout short and broad, as long as eye ; mouth directed upwards ; lower jaw projecting ; eye 4 times in length of head, twice in interorbital width ; space between eye and lip about $\frac{1}{4}$ diameter of former. Dorsal 13, originating at equal distance from head and from base of caudal ; longest (posterior) rays $\frac{2}{3}$ to once length of head. Anal 15–16, originating slightly in advance of dorsal. Pectoral $\frac{2}{3}$ length of head, just reaching base of ventral, which is small and midway between end of snout and base of caudal. Caudal rounded, with one of the upper and one of the lower rays produced (males). Caudal peduncle a little longer than deep. 28–31 scales in longitudinal series, 22–24 round body in front of ventrals ; lateral line entirely absent, or indicated by a few pits. Olive above, white below ; sides of head and body, chin, and fins with crimson spots ; upper edge of dorsal and upper and lower edge of caudal white.

Total length 60 mm.

Head-waters of Cross River, Calabar. Three specimens from Okwoga, lat. 7° N., long. 7° 45′ E., were presented by Mr. R. D. Gard'ner.

*Fundulus batesii.*

Depth of body $4\frac{1}{2}$ times in total length, length of head $3\frac{1}{2}$ times. Head flat above ; snout short and broad, as long as eye ; mouth directed upwards ; lower jaw projecting ; eye $3\frac{2}{3}$ times in length of head, $1\frac{1}{2}$ times in interorbital width.

Dorsal 14–15, originating midway between eye and root of caudal, longest (posterior) rays $\frac{2}{3}$ to $\frac{3}{4}$ length of head; space between eye and lip very narrow, the latter forming an angle fitting into a notch close to the former. Anal 14–15, exactly opposite to dorsal. Pectoral $\frac{2}{3}$ length of head, not quite reaching base of ventral, which is small and midway between end of snout and base of caudal. Caudal acuminate, bifurcate in the middle in males. Caudal peduncle $1\frac{2}{3}$ times as long as deep. 33–35 scales in longitudinal series, 24–26 round body in front of ventrals; lateral line indicated by a series of pits. Males olive-brown, profusely spotted with crimson; a crimson streak from eye to eye round the chin; dorsal and anal fins dark purplish, anal edged with lighter; pectoral paler, edged with crimson; caudal broadly edged with yellow above and beneath. Females yellowish olive, with small crimson spots.

Total length 66 mm.

South Cameroon (Congo Basin). Several specimens from the Ja and Bumba Rivers, from the collection of Mr. G. L. Bates.

*Fundulus walkeri.*

Depth of body $3\frac{2}{3}$ to 4 times in total length, length of head 3 to $3\frac{1}{3}$ times. Head flat above; snout short and broad, a little shorter than eye; mouth directed upwards, lower jaw projecting; eye $3\frac{1}{2}$ times in length of head, nearly twice in interorbital width; space between eye and lip very narrow, the latter forming an angle fitting into a notch close to the former. Dorsal 14, originating midway between occiput and root of caudal, posterior rays longest, $\frac{2}{3}$ to $\frac{2}{3}$ length of head. Anal 15–16, originating slightly in advance of dorsal. Pectoral $\frac{2}{3}$ length of head, reaching base of ventral; latter small, equally distant from end of snout and from root of caudal. Caudal rounded. Caudal peduncle as long as deep. 28–30 scales in longitudinal series, 22–24 round body in front of ventrals; lateral line indicated by a series of pits. Uniform brownish (badly preserved specimens).

Total length 42 mm.

Gold Coast. Three specimens, obtained at the Bokitsa Mine by the late Mr. R. B. Walker.

*Haplochilus ansorgii.*

Depth of body 4 times in total length, length of head $3\frac{1}{3}$ to $3\frac{1}{2}$ times. Head flat above; snout broad, rounded, as long as eye; mouth directed upwards, lower jaw slightly pro-

jecting; eye $3\frac{2}{3}$ to 4 times in length of head, $\frac{1}{2}$ interorbital width; præorbital about $\frac{1}{4}$ diameter of eye. Dorsal 11, originating twice as far from occiput as from root of caudal, above middle of anal; longest rays about $\frac{3}{4}$ length of head (males). Anal 16. Pectoral $\frac{3}{4}$ length of head, reaching base of ventral; latter small, equally distant from end of snout and from root of caudal. Caudal acuminate, a little longer than head. Caudal peduncle as long as deep. 30–31 scales in longitudinal series, 18 round body in front of ventrals; lateral line indicated by a series of pits. Olive-brown above, yellowish beneath; sides with regular longitudinal series of carmine spots, following the series of scales and more or less confluent; lower lip blackish; fins grey, edged with black, dorsal and anal with round purplish-black spots.

Total length 70 mm.

Ogowe. Two specimens, obtained by Dr. W. J. Ansorge in the Masoma River, flowing into the Ogemwe at Umpokoya.

### *Haplochilus brucii.*

Depth of body 4 to $4\frac{1}{2}$ times in total length, length of head 3 to $3\frac{1}{2}$ times. Head flat above; snout broad, rounded, a little shorter than eye; mouth directed upwards, lower jaw slightly projecting; eye $3\frac{1}{3}$ to $3\frac{1}{2}$ times in length of head, $1\frac{2}{3}$ to $1\frac{3}{4}$ times in interorbital width; præorbital very narrow. Dorsal 12–13, originating at equal distance from head and from root of caudal, above anterior third (fourth or fifth ray) of anal; longest ray $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Anal 14–15. Pectoral about $\frac{2}{3}$ length of head, not reaching ventral; latter equally distant from end of snout and from root of caudal. Caudal rounded, as long as head. Caudal peduncle $1\frac{1}{2}$ times as long as deep. 30–34 scales in longitudinal series, 24–26 round body in front of ventrals; an interrupted series of very shallow lateral line pits. Pale yellowish olive, with or without small carmine dots on the sides of the head and body and on the dorsal and caudal fins.

Total length 32 mm.

Lower Niger. Several specimens from a pool at Udi, presented by Major G. E. Bruce.

### *Haplochilus lujæ.*

Depth of body 4 to 5 times in total length, length of head $3\frac{1}{2}$ to 4 times. Head flat above; snout broad, rounded, a little shorter than eye; mouth directed upwards, lower jaw

projecting; eye $3\frac{1}{2}$ to $3\frac{2}{3}$ times in length of head, $1\frac{1}{2}$ to $1\frac{2}{3}$ times in interorbital width; præorbital very narrow. Dorsal 10–11, originating twice as far from centre or anterior border of eye as from root of caudal, above middle of anal; longest ray about as long as head in males, about $\frac{2}{3}$ length of head in females. Anal 14–15. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head, not reaching ventral; latter small, equally distant from end of snout and from root of caudal. Caudal rounded, as long as head, with one of the upper and one of the lower rays more or less produced in males. Caudal peduncle $1\frac{2}{3}$ to 2 times as long as deep. 29–32 scales in longitudinal series, 20–22 round body in front of ventrals; lateral line represented by a more or less distinct series of pits. Males olive above, yellowish beneath, with numerous rather large carmine spots disposed irregularly; dorsal fin with small round purple spots; anal and caudal with large purple markings, which may form streaks in the direction of the rays. Females yellowish, the scales of the upper parts edged with olive-brown; small red or orange spots sometimes present on the sides; dorsal, anal, and caudal with small purplish-brown spots.

Total length 45 mm.

Numerous specimens were obtained by M. E. Luja at Konduc, Kasai, Belgian Congo.

*Haplochilus cabindæ.*

Depth of body equal to length of head, $3\frac{1}{2}$ times in total length. Head flat above; snout much shorter than eye; mouth directed upwards, lower jaw projecting; eye $2\frac{2}{3}$ times in length of head, a little less than interorbital width; præorbital $\frac{1}{3}$ diameter of eye. Dorsal 9, originating at equal distance from head and from root of caudal, or a little nearer latter, above middle of anal; longest rays $\frac{3}{5}$ length of head. Anal 15, longest rays $\frac{3}{5}$ length of head. Pectoral $\frac{3}{4}$ length of head, reaching beyond base of ventral; latter small, much nearer end of snout than root of caudal. Caudal truncate, as long as head. Caudal peduncle $1\frac{1}{2}$ times as long as deep. 31 scales in longitudinal series, 16 round body in front of ventrals; no lateral line pits. Yellowish, finely speckled with blackish, the vertebral line and a broad lateral band olive-brown; fins uniform greyish.

Total length 38 mm.

Portuguese Congo. Two specimens were obtained at Cabinda by Dr. W. J. Ansorge.

*Haplochilus exiguus.*

Depth of body 4 times in total length, length of head $3\frac{1}{3}$ times. Head flat above; snout broad, rounded, a little shorter than eye; mouth directed upwards, lower jaw slightly projecting; eye $3\frac{1}{2}$ times in length of head, $\frac{2}{3}$ interorbital width; præorbital nearly $\frac{1}{3}$ diameter of eye. Dorsal 8, originating twice as far from eye as from root of caudal, above middle of anal; penultimate ray produced into a long filament (male). Anal 12. Pectoral $\frac{3}{5}$ length of head, barely reaching base of ventral; latter equally distant from end of snout and from root of caudal. Caudal rounded, slightly shorter than head. Caudal peduncle $1\frac{1}{2}$ times as long as deep. 28 scales in longitudinal series, 22 round body in front of ventrals. Yellowish, sides tinged with carmine; a carmine streak on each side of the head, through the eye and round the chin; another below the eye; gill-membranes, pectorals, and ventrals edged with carmine; dorsal and anal with a carmine longitudinal streak and some carmine spots; caudal bordered all round with carmine, with three bars of the same colour.

Total length 32 mm.

South Cameroon. A single specimen, from the Nyong River, received from Mr. G. L. Bates.

*Haplochilus calliurus.*

Depth of body $3\frac{1}{2}$ to $4\frac{1}{3}$ times in total length, length of head $3\frac{1}{3}$ to $3\frac{2}{3}$ times. Head flat above; snout short and broad, nearly as long as eye; mouth directed upwards, lower jaw feebly projecting; eye $3\frac{2}{3}$ to 4 times in length of head, twice in interorbital width; præorbital not more than $\frac{1}{4}$ diameter of eye. Dorsal 9–10, originating twice as far from centre or anterior border of eye as from root of caudal, above middle of anal; longest ray $\frac{3}{5}$ to $\frac{2}{3}$ length of head in females, antepenultimate produced into a long filament in males. Anal 12–13, the antepenultimate ray produced into a very long filament in males. Pectoral $\frac{2}{3}$ to $\frac{4}{5}$ length of head, reaching base of ventrals in males, not in females; ventral equally distant from end of snout and from root of caudal, outer ray produced into a short filament in males. Caudal rounded-acuminate or decidedly pointed, one of the median rays produced in males. Caudal peduncle $1\frac{1}{3}$ to $1\frac{1}{2}$ times as long as deep. 29–30 scales in longitudinal series, 20–22 round body in front of ventrals; lateral line indicated by a series of pits. Olive or brownish above, yellowish white

beneath, with carmine spots, which are larger and lighter in the males, in which they may be confluent into longitudinal streaks; fins greyish, dorsal and caudal spotted with carmine; in males anal edged with carmine and white and lower border of caudal similarly marked.

Total length 50 mm.

Liberia. Several specimens, presented by Mr. J. Paul Arnold. I had first referred these fish to my *H. elegans*, and it is under that name that Mr. Arnold has published notes on it, together with an excellent coloured figure, in the 'Wochenschricht für Aquarien- und Terrarienkunde,' vol. v. no. 23, 1908. *H. elegans* differs in having D. 7–8, A. 14–15.

*Haplochilus striatus.*

Depth of body 4 to $4\frac{1}{3}$ times in total length, length of head $3\frac{1}{2}$ to $3\frac{2}{3}$ times. Head flat above; snout short and broad, shorter than eye; mouth directed upwards, lower jaw projecting; eye $3\frac{1}{3}$ times in length of head, $1\frac{1}{2}$ times in interorbital width; præorbital about $\frac{1}{4}$ diameter of eye. Dorsal 9–10, originating twice as far from centre or anterior border of eye as from root of caudal, above middle of anal, acutely pointed behind, longest ray $\frac{3}{4}$ length of head (males). Anal 13, pointed like the dorsal. Pectoral $\frac{3}{4}$ to $\frac{4}{5}$ length of head, reaching base of ventral; latter small, equally distant from end of snout and from root of caudal. Caudal rounded, with one of the upper rays produced into a short filament. Caudal peduncle $1\frac{1}{3}$ times as long as deep. 30–31 scales in longitudinal series, 20–22 round body in front of ventrals; lateral line pits very indistinct or absent. Pale olive above, yellowish white beneath; carmine spots forming 3 or 4 regular longitudinal series on each side, separated by olive streaks; fins greyish, dorsal and anal edged with carmine and with a carmine median streak; caudal spotted with carmine and with a carmine and white streak above and below.

Total length 38 mm.

Ogowe. Four specimens from the Abanga River, between the first and second rapids, collected by Dr. W. J. Ansorge.

*Haplochilus longiventralis.*

Depth of body $4\frac{1}{3}$ to 5 times in total length, length of head 3 to $3\frac{1}{3}$ times. Head flat above; snout rounded, a little longer than eye; mouth directed upwards, lower jaw slightly projecting; eye $3\frac{1}{2}$ to $3\frac{2}{3}$ times in length of head, $1\frac{2}{3}$ to $1\frac{3}{4}$

times in interorbital width ; præorbital barely $\frac{1}{4}$ diameter of eye. Dorsal 9, originating twice as far from head as from root of caudal, above posterior third of anal ; longest rays $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Anal 15–16. Pectoral a little shorter than head, extending beyond base of ventral ; latter $\frac{1}{2}$ as long as head in females, much produced and at least as long as pectoral in adult males, equally distant from end of snout and from root of caudal. Caudal rounded-acuminate, longer than head. Caudal peduncle as long as deep. 25–27 scales in longitudinal series, 20 round middle of body in front of ventrals ; lateral line indicated by a series of pits. Pale brown above, yellowish beneath, with or without carmine dots ; lower part of sides with numerous vertical or oblique dark brown or carmine narrow bars ; some dark spots may be present on the dorsal fin and on the base of the caudal.

Total length 55 mm.

Southern Nigeria. Several specimens were obtained in swamps between Agwarba and Awka by Mr. R. D. Gard'ner. I have received others from the mouths of the Niger and Old Calabar through Mr. J. Paul Arnold, for whom I had identified them as *H. senegalensis*, Stdr. I now think they represent a distinct species, characterized by longer ventral fins.

*Haplochilus grahami.*

Depth of body 4 to $4\frac{1}{2}$ times in total length, length of head 3 to $3\frac{1}{3}$ times. Head flat above ; snout broad, rounded, a little shorter than eye ; mouth directed upwards ; lower jaw projecting ; eye 3 to $3\frac{1}{3}$ times in length of head, $1\frac{1}{2}$ times in interorbital width ; præorbital barely $\frac{1}{4}$ diameter of eye. Dorsal 7, originating about twice as far from occiput as from root of caudal, above posterior fourth of anal, longest rays $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Anal 15–16, longest rays $\frac{1}{2}$ to $\frac{3}{4}$ length of head. Pectoral $\frac{3}{4}$ length of head, extending beyond base of ventral ; latter small, equally distant from end of snout and from root of caudal. Caudal pointed, longer than head. Caudal peduncle slightly longer than deep. 28–29 scales in longitudinal series, 20–22 round body in front of ventrals ; lateral line indicated by a series of pits. Yellowish or pale brownish, with or without small crimson spots ; 6 or 7 blackish vertical bars on the body, some reaching the back, some confined to the lower half of the body ; a black blotch at the base of the caudal fin ; fins greyish (yellow in life), caudal with small purplish-brown spots.

Total length 38 mm.

Lagos, in swamps. Several specimens were presented by Dr. W. M. Graham.

*Haplochilus macrostigma.*

Depth of body $4\frac{1}{3}$ times in total length, length of head $3\frac{1}{2}$ times. Head flat above; snout as long as eye; mouth directed upwards, lower jaw scarcely projecting; eye $3\frac{1}{2}$ times in length of head, $1\frac{2}{3}$ times in interorbital width; præorbital very narrow. Dorsal 9, originating twice as far from head as from root of caudal, above posterior third of anal; longest ray $\frac{1}{2}$ length of head. Anal 16. Pectoral $\frac{2}{3}$ length of head, reaching base of ventral; latter small, equally distant from end of snout and from root of caudal. Caudal rounded-acuminate, longer than head. Caudal peduncle as long as deep. 28 scales in longitudinal series, 18 round body in front of ventrals; lateral line indicated by a series of pits. Pale olive, with large crimson spots; fins greyish, dorsal, anal, and caudal with small crimson spots.

Total length 40 mm.

Portuguese Congo. A single specimen from Cabinda, received from Dr. W. J. Ansorge.

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## XXXII.—*A new Genus of Ruteline Coleoptera from the Indian Region.* By Gilbert J. Arrow.

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### Micranomala, gen. nov.

Body very small, elongate and depressed. Clypeus small, narrowed to the front, where it is strongly reflexed and emarginate, with prominent lateral angles. Clypeal suture strongly marked, carinate and nearly straight. Eyes very large, with the inner margin nearly straight dorsally and very oblique, so that the intervening space is nearly twice as wide behind as in front. Antennæ 9-jointed, long and slender. Prothorax moderately transverse, not much narrowed in front, completely but narrowly margined, with the base almost straight. No sternal process. Legs long; front tibiæ tridentate, the uppermost tooth minute. Tarsi and claws slender; front and middle tarsi with the longer claw cleft near the middle of its length. Elytra with membranous outer margins. ♂. Eyes much larger than in the female. Inner front claw strongly dilated.

This genus has most of the characters of *Anomala*, but is clearly separated from it by a combination of peculiar

features, the most important of which are the emarginate and biangulate clypeus, the obliquely placed eyes, and the great enlargement of these in the male. The cleavage of the claws far from the tip is also an exceptional feature, although occurring in the subgenus *Adoretosoma*. I am not at present able to properly examine the organs of the mouth, having only a single specimen of each of the three species. These are all Indian and all of very small size.

They may be tabulated as follows :—

i. Clypeus and forehead strongly punctured ..... *indica.*
ii. Clypeus smooth, forehead punctured ..... *birmanica.*
iii. Clypeus and forehead smooth ..... *cingalensis.*

*Micranomala indica*, sp. n.

Pallide testacea, capite tarsisque rufis ; clypeo sat crebre et grosse punctato, antice subangulatim emarginato, angulis paulo obtusis, fronte late longitudinaliter impresso, fortiter vix crebre punctato ; prothorace distincte fere æqualiter punctato, lateribus medio angulatis, antice et postice fere rectis, æqualiter approximatis, angulis anticis acutis, posticis obtusis ; scutello punctato ; elytris profunde striato-punctatis, interstitiis angustis, fere æqualibus ; pygidio fortiter, metasterno fortiter sat crebre, punctatis ; corpore toto glabro, subtus parcissime piloso :

♂, oculis maximis, quam spatiam interjicientem antice paulo latioribus.

Long. 7·5 mm. ; lat. max. 3·5 mm.

*Hab.* S. India : Coimbatore.

It is pale testaceous, with the head and tarsi reddish. The clypeus is strongly and closely punctured and subangularly emarginate in front, with prominent but not acute lateral angles. The forehead is rather strongly channelled along the middle and strongly punctured, but a little less closely than the clypeus. The pronotum is moderately closely and rather evenly punctured, and the lateral margins are angulate in the middle, nearly straight, and very slightly contracted from there to the front and hind angles, of which the front are acute and the hind obtuse. The scutellum is distinctly punctured and the elytra coarsely and closely in strongly impressed rows placed close together at almost equal distances. The pygidium is strongly, but not closely, and the metasternum closely punctured. There is only a very scanty clothing of hairs upon the lower surface. The front tibia bears three sharp teeth.

The male has the eyes very large, their diameter being rather wider than the intervening space at its narrowest part.

The inner front claw is very broad and sharply angulated at its lower edge.

The single specimen was presented to the British Museum in 1861 by Mr. Walhouse, of the Madras Civil Service.

*Micranomala cingalensis*, sp. n.

Pallide testacea, capite tarsisque rufis; clypeo minutissime alutaceo-punctulato, punctis nonnullis inconspicuis paulo majoribus, margine antico leviter emarginato, angulis obtusis, fronte haud impressa, minute et parce punctata; prothorace distincte, fere æqualiter punctato, lateribus antice arcuatis, postice rectis; scutello punctato; elytris profunde striato-punctatis, interstitiis angustis, fere æqualibus; pygidio et metasterno sat fortiter et crebre punctatis; corpore toto glabro, subtus parcissime piloso.
Long. 7 mm.; lat. max. 3·5 mm.

*Hab.* Ceylon: Colombo.

This species, of which a single female has been found by Mr. E. E. Green, is of the same colour, size, and shape as *M. indica*, but the clypeus and forehead are scarcely perceptibly punctured and the latter is not impressed. The sides of the pronotum are rounded in front and not distinctly angulated in the middle. The sculpture of pronotum, scutellum, elytra, and lower surface is almost the same as in *M. indica*, but the pygidium is rather more closely punctured. The front tibia has two acute teeth and an extremely feeble upper one.

*Micranomala birmanica*, sp. n.

Pallide testacea, capite tarsisque rufis; clypeo nitidissimo, vix punctato, lateribus contractis, fere rectis, margine antico fere recto, angulis obtusis, fronte haud impressa, distincte haud dense punctata; pronoto modice punctato, medio magis dense punctato, leviter longitudinaliter sulcato, lateribus medio subangulatis, antice et postice fere rectis, æqualiter approximatis, angulis anticis acutis, posticis obtusis; scutello punctato; elytris fortiter fere æqualiter striato-punctatis; pygidio et metasterno fortiter punctatis:
♂, oculis maximis, quam spatiam interjicientem antice latioribus.
Long. 6 mm.; lat. max. 3·25 mm.

*Hab.* S. Tenasserim: Victoria Point.

Although a little smaller this species is superficially extremely like the other two. The clypeus is very smooth and shining, without perceptible punctures. The lateral margins are prominent at the base and from there nearly straight, and the front margin is nearly straight in the middle, with a

distinct but obtuse angle on each side. The forehead is distinctly but not closely punctured and not impressed in the middle. The pronotum is well punctured, rather closely in the middle, where there is a slight longitudinal groove in the anterior part, and less closely at the sides. The lateral margins are subangulate in the middle, slightly approximating but scarcely curved from there to the front and hind angles, of which the former are acute and the latter obtuse. The uppermost (third) tooth of the front tibia is very feeble.

The distinctive features of the male are as in *M. indica*.

The single specimen was taken by the late E. T. Atkinson.

XXXIII.—*On a new Species of* Semnopithecus (Semnopithecus poliocephalus) *from Tonkin*. By E.-L. Trouessart, Professeur au Muséum d'Histoire naturelle de Paris.

[Plate VII.]

The Gibbons and *Semnopitheci* * of the Oriental region of Indo-China are up to the present time very little known, and some recent papers, on the genus *Hylobates* in particular, have only succeeded in further confusing the synonymy of the species. So far as regards Tonkin (and *Semnopithecus nemœus* being left out of account) the only species known from this region is *Semnopithecus françoisi*, Pousargues †, which is from Kouang-Si. The following species, which is from further north, appears very distinct from it, although taking its place in the same subgeneric group.

*Semnopithecus* (*Lophopithecus*) *poliocephalus*, sp. n.
(Pl. VII.)

In this monkey the head, which is entirely white as far as the shoulders, is sharply distinguished from the rest of the pelage, which is black above and beneath excepting a grey tint on the thighs.

* I preserve for this genus the name, generally adopted, of *Semnopithecus*, F. Cuvier, 1821, until authors come into agreement as to what should have priority. *Presbytis*, Eschscholz, is of the same year 1821, but the exact date either of the day or of the month has never been given which would assure it the priority over the former. Moreover, other naturalists have adopted *Pygathrix*, E. Geoffroy, 1812, which itself is posterior to *Lasiopyga*, Illiger, 1811, founded likewise on the *Simia nemœa* of Linné.

† 'Bulletin du Muséum d'Histoire naturelle de Paris,' 1898, p. 319.

The pelage of the head is of a bright flavous yellow, passing into white around the circumference of the face and into golden yellow at the point of the crest. All the hairs of the summit of the head converge at the top to form a pyramidal crest having exactly the form of a circus-clown's peruke. The flavous yellow of the head passes into golden yellow on the neck, then into brownish yellow on the upper part of the shoulders, where this colour merges, almost insensibly, at the height of the clavicles and the nape, into the deep black of the chest and back. All the rest of the body and the tail are of the same black above and below, with the exception of the base of the tail and the outer part of the thighs, where the black hairs are mingled with white—or white-ringed—hairs which make this part of the body appear as if covered with hoar-frost. The hairs of the back attain a length of from 10 to 12 centimetres. The face, the ears, and the naked parts of the fore limbs are of a bluish black. On the face the eyebrows bear erect scattered black hairs, 2 to 3 cm. long; some fine whitish hairs, with rarer black hairs, on the upper lip; the chin is not bearded, but has a short collar of flavous-yellow hairs, passing into brownish yellow beneath the throat. The tail, which is long and slender, is covered with rather short hairs. The callosities of the rump are flesh-colour. The specimen is a female.

Length of the body 45 cm. (circa); of the tail 80 cm.

Muséum de Paris, E. 1911. 22. 7. no. 33; C. G. no. 481.

*Hab.* According to M. le Docteur Marcel Léger, médecin-major des troupes coloniales, who has brought the skin with the skull from Tonkin, this *Semnopithecus* is not rare in the province of Caï-Khin, to the north-east of Tonkin.

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XXXIV.—*Description of a new Genus of the Coleopterous Family* Buprestidæ. By Chas. O. Waterhouse, I.S.O., F.E.S.

Some years ago I described in the 'Biologia Centrali-Americana' (Coleopt. iii. 1, p. 28) a species of Buprestidæ under the name of *Sphenoptera purpurascens*, from Honduras. I pointed out at the time that it differed from typical *Sphenoptera* in having a small scutellum. I have recently re-examined this specimen (unfortunately unique), and have come to the conclusion that it should be separated as a distinct genus and be placed near *Cinyra*.

DITRIÆNA, gen. nov.

Sternal cavity formed laterally by the mesosternum and posteriorly by the metasternum. Lateral portions of the mesosternum moderately elongate. Antennal pores in a fossa at the lower anterior angles of the joints. Front of the head rather broad, nearly parallel-sided, not constricted at the insertion of the antennæ, the eyes scarcely oblique. Scutellum small, transversely oval. Epipleural lobe of the elytra considerably arched, so that it covers one-third of the metasternal epipleuron. Antennæ inserted very near the eyes, as in *Cinyra*, the cavity very small and without any distinct carina above it. Basal joint of the posterior tarsi longer than the second joint, but not so long as the second and third together. Thorax evenly convex, slightly transverse, sides nearly parallel, the base with a small central fovea. Elytra subparallel for some distance, and then gradually narrowed to the apex (each armed with three small acute spines), striate-punctate, costate posteriorly.

I think there can be no doubt that this genus should be placed next to *Cinyra*, from which it differs by its more parallel form, shorter tarsi, and in having three spines at the apex of each elytron. The tibiæ are rather stout, and the middle as well as the anterior ones are slightly curved inwards and finely serrate on the inner side.

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XXXV.—*The Nomenclature of the Rheas of South America.* By LORD BRABOURNE, F.Z.S., M.B.O.U., and C. CHUBB, F.Z.S., M.B.O.U., Zoological Department, British Museum.

ON going into this question we find that Linnæus founded his *Struthio americanus* (=*Rhea americana*) on "Nhandu-guacu brasiliensibus" of Marcgrave, and his name is applicable to the bird known as *Rhea macrorhyncha*, Sclater, P. Z. S. 1860, p. 207; consequently *Rhea americana* of authors (nec Linn.) requires a new name, for which we propose

*Rhea rothschildi.*

*Adult male.* Crown of head, lower hind-neck, middle of the mantle, lower fore-neck, and sides of the upper breast black; sides of the crown, upper hind-neck, and upper fore-neck

greyish white with black shafts and elongated hair-like tips to the feathers, becoming buff-colour on the sides of the neck; chin and upper throat white; sides of the upper mantle and short wing-feathers lead-grey, with black shaft-lines; the long wing-feathers are disintegrated and composed of colours black, white, grey, and brown; the upper back is dusky black, becoming paler and gradually merging on to the lower back, which is silvery grey with darker shaft-lines like the flanks and thighs; middle of upper breast ash-grey; remainder of under surface pearl-white.

Total length 53 inches; exposed portion of culmen 3·5; tarsus 13·0; middle toe and claw 6·0.

The type, which was collected at Ynglases, Ajó, Buenos Ayres, on the 27th of May, 1909, is in the British Museum.

We have much pleasure in naming this Rhea in honour of the Hon. Walter Rothschild, who has done so much for the advancement of ornithology in various parts of the world.

Since this was drawn up the Hon. Walter Rothschild has called our attention to a paper by himself, "On the former and present Distribution of the so-called Ratitæ," which is being published in the 'Proceedings' of the Fifth International Ornithological Congress held in Berlin, 1910.

In this paper he had anticipated us by pointing out that *Rhea macrorhyncha* of Sclater was a synonym of *Struthio americanus* of Linnæus, but had accepted for *Rhea americana* of authors (nec Linnæus) *Rhea nandu* of Lesson.

We had already looked into this, and concluded that *Rhea nandu* was simply a substitute name for the Rheas as a whole, and consequently inacceptable for this species. In support of which we copy Lesson's introduction of his name (Man. d'Orn. ii. p. 208, 1828):—"Ce genre ne renferme qu'une espèce nommée *nandu, churi, autruche d'Amérique,* et quelquefois par erreur *touyou.* C'est le *rhea nandu,* ou *struthio rhea* de Linné, qui vit sur les bords du détroit de Magellan, où les voyageurs l'ont souvent prise pour une véritable espèce d'autruche."

Moreover, Temminck, in the 40th livraison of the Pl. Col., text to pl. 237 (1823), had already used *Rhea nandua* as a substitute name for *Rhea americana*, and this usage has five years priority over Lesson.

We also find that d'Orbigny, in the Itinerary of his Voyage (ii. p. 67, note, 1834), gave the chief diagnostic character, when he proposed the name of *Rhea pennata* for the species from Patagonia commonly known as *Rhea*

*darwini*, Gould; and as he has three years priority over Gould, his name must be accepted.

The species, with their type localities, will in future be known as :—

*Rhea americana* (Linn.), Syst. Nat. i. p. 155, 1758. (Sergipe, East Brazil—ex Marcgrave.)

*Rhea rothschildi*, Brabourne and Chubb. (Argentina.)

*Rhea pennata*, d'Orb. (Patagonia.)

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## XXXVI.—*Two new Species of* Lepus.

By R. E. Drake-Brockman, M.R.C.S., L.R.C.P., F.Z.S.

*Lepus crispii*, sp. n.

This species is remarkable for its diminutive size and general pale coloration. Although the fur of both specimens obtained appears to be bleached, the pale colour and small size render it quite distinct.

In its bleached state the fur of this species differs markedly from the bleached fur found in *L. somalensis*. The fur is pale grey at the base, then pale buff followed by a distinct light brown band, while the terminal part of the hairs is creamy white, rendering the animal almost indistinguishable from the sand in the region where it lives.

The back of the neck is of a pinkish buff, while the whole of the fur on the underparts, with the exception of a narrow longitudinal band of white, is pale buff. The fur on the legs is very similar to that on the back.

The head is of the general body-colour, but it will be seen that where the new fur is appearing the hairs are tipped with black, which soon fades to a dark brown and then rapidly gets bleached.

The chin is white, there is a distinct light-coloured area round the eyes, the whiskers are black tipped with white, and the ears long, scantily covered with hair and edged with a creamy buff, except at the tip of the ear, where it is brown.

I have taken as the type specimen my number 354, a male shot near Obbia, Italian Somaliland, on December 23rd, 1910.

The measurements, in the flesh, of this specimen were as follows :—

| | mm. |
|---|---|
| Head and body | 375 |
| Tail | 100 |
| Hind foot | 93 |
| Ear | 100 |
| Weight | 1½ lbs. |

The above and another specimen were shot on an open maritime plain, practically destitute of verdure.

Skull-measurements :—

| | mm. |
|---|---|
| Total length | 69 |
| Basal length | 51·5 |
| Greatest interzygomatic width | 35·5 |
| Least interocular width | 14 |
| Upper cheek-teeth | 12·5 |
| Palatal foramen | 16 |
| Length of nasal bones (in middle line) | 20 |
| Greatest length of nasals | 26 |

It gives me great pleasure in naming this small hare after Captain Crispi, the Italian Resident at Obbia on the Miffertain Coast of Italian Somaliland, through whose kindness I was enabled to get this specimen.

*Lepus cordeauxi*, sp. n.

A large hare very unlike *L. somalensis* in general coloration. Skull-measurements greater in every respect.

Fur long, individual hairs black with pale buff subterminal band; underfur silver-grey. Underfur on flanks as on back, with tips of longer hairs black, unlike those in *L. somalensis*, in which they are white.

Fur of chest buff tipped with black, whereas in *L. somalensis* they are pinkish buff. Hairs of legs reddish buff with black tips. Underfur of head brownish, longer hairs with bands of buff and tipped with black.

Back of neck cinnamon-colour. Ears well covered with short hairs, edges buff, apex of ears black.

Measurements in the flesh were unfortunately not taken. Sex unknown.

Collected by me at Sheikh Mahomed, Eastern Arussi, Abyssinia, October 29th, 1908. B.M. no. 9. 6. 1. 37.

Skull-measurements :—

(Skull badly damaged, but it will be seen that the measurements which can be taken are all greater than those of *L. somalensis*.)

| | mm. |
|---|---|
| Least interzygomatic width | 40 |
| Interorbital width | 22 |
| Length of parietals in middle line | 38 |
| „ nasals „ „ „ | 29 |
| Nasals, greatest length | 39 |
| From anterior angle of orbit to gnathion | 39 |
| Upper cheek-teeth | 16 |
| Width of palate at $m^1$ | 12·5 |
| Length of palatal foramen | 23 |

Top of skull flatter than in *L. somalensis*, in which the supraorbital plates are more arched.

I have named this fine species after Captain H. E. S. Cordeaux, C.B., C.M.G., His Majesty's late Commissioner and Commander-in-Chief for the Somaliland Protectorate.

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## XXXVII.—*On some Local Forms of* Cephalophus natalensis.

By R. C. Wroughton.

In identifying a specimen of the *natalensis* group of South-African duikers, I had occasion to lay out all the specimens of this group in the Museum Collection; it then became abundantly evident that there are several well-marked geographical races.

So far as I can ascertain, only two names have been given in this group south of British East Africa, whence Mr. Thomas has described *harveyi*; these are *robertsi*, Rothsch., and *vassei*, Trouess., both from the southern portion of Portuguese East Africa. There are four specimens from this area in the Collection—viz., two from Inhambane, near the mouth of the river Limpopo, and two from Gorongoza, near the mouth of the Zambesi. These make a very even series, agreeing very fairly with Rothschild's *robertsi*. The most prominent character said to distinguish *vassei* from *robertsi* is that this latter has "les parties intérieures blanches." This, however, is based on a misunderstanding, and there is no difference between the two on this point: *vassei* must therefore, I think, be accepted as a synonym of *robertsi*.

The four races I can distinguish may be arranged in a key as follows :—

| | |
|---|---|
| A. Size smaller: head and body and hind foot rarely reaching 800 and 200 mm. respectively. Colour darker. Ears shorter, 75 mm. | |
| *a*. Colour "tawny"; nape pale slate-grey. (Natal, Zululand.) ..... | *C. natalensis*, A. Sm. |
| *b*. Colour richer, redder on back, yellower on flanks; nape almost black. (Transvaal.) ..... | *C. n. amœnus*, subsp. n. |
| B. Size larger: head and body and hind foot reaching well above 800 and 200 mm. respectively. Colour paler. Ears longer, 85 mm. | |
| *a*. Colour "tawny ochraceous," paler below. (Portuguese E. Africa.) ..... | *C. n. robertsi*, Roths. |
| *b*. Colour much paler, below dirty white. (Nyasa.) ..... | *C. n. bradshawi*, subsp. n. |

### *Cephalophus natalensis*, A. Smith.

1834. *Cephalophus natalensis*, A. Sm. S. Afr. Quart. Journ. ii. p. 217.

General colour above "tawny," below paler. Throat as far back as ears white, remainder of throat, chest and cheeks slightly paler than belly. Nape pale slaty blue with a brownish tinge. Area of face above nostrils tinged greyish.

Dimensions (as given by Smith) :—

Head and body 850 mm. ; tail 112 ; ears 62.

The label on the type specimen states that these measurements exactly corresponded with those of the *stuffed* specimen, from which they were therefore evidently taken. The type was a rather young female (last molar not quite up) ; in an adult male specimen from Zululand the length of the head and body measured in the flesh is recorded as 759 mm. and the ears as 76 mm., and these are almost certainly more reliable figures of the dimensions.

### *Cephalophus natalensis amœnus*, subsp. n.

Size as in *natalensis*. General colour above darker than in *natalensis* ; back redder, flanks yellower, belly scarcely paler than back ; white throat-patch as in *natalensis* ; lower throat slightly paler than belly. Nape very much darker than in true *natalensis*, almost black.

Skull as in *natalensis*.

Dimensions of the type (body-measurements recorded by collector) :—

Head and body 818 mm. ; tail 89 ; hind foot 199 ; ear 75.

Skull : greatest length 165 ; basal length 143 ; palatal length 83 ; zygomatic breadth 72 ; nasals 51 ; upper molar series 44.

*Hab.* Transvaal (type from Legogot).

*Type.* Old male. B.M. no. 6. 11. 7. 13. Original number 1468. Collected 19th May, 1906, by C. H. B. Grant, and presented to the Museum by Mr. C. D. Rudd.

### *Cephalophus natalensis robertsi.*

1906. *Cephalophus robertsi*, Roths. P. Z. S. p. 691.
1907. *Cephalophus natalensis vassei*, Trouess. Bull. Mus. H. N. no. 7, p. 443.

Size somewhat larger than *natalensis*. General colour "uniform orange-chestnut (or pale Chinese orange), of a much paler yellower and brighter shade" than in *natalensis* ;

white throat-patch as in *natalensis*, lower throat and chest only slightly tinged with rufous; belly paler than back. Nape darker than in *natalensis*, the hairs where the nape-patch fades into the back markedly ringed dark slate and ochraceous. Marked patch on face above the nostrils ash- or mouse-grey, this patch almost indiscernible in true *natalensis* and limited to a short median line, 10–15 mm. broad, in *amœnus*.

Dimensions of an adult male from the Gorongoza District, Portuguese East Africa :—

Head and body 850 mm.; tail 121 ; hind foot 197 (? 207); ear 85.

Skull: greatest length 168; basal length 148 ; palatal length 35 ; zygomatic breadth 74; nasals 58; upper molar series 46.

The type locality is given as Portuguese East Africa by Mr. Rothschild. The specimen described above is almost an absolute topotype of Dr. Trouessart's type of *vassei*.

*Cephalophus natalensis bradshawi*, subsp. n.

Size as in *robertsi*. General colour pale tawny ochraceous, much paler and yellower than even *robertsi*. White throat-patch as usual, but all the rest of the throat, chest, inner side of fore limbs, and belly almost white, only slightly tinged with rufous. Nape-patch somewhat more developed than in *robertsi*. Grey patch on lower face even more marked than in *robertsi*.

Dimensions :—

No body-measurements were recorded by the collector, but almost certainly these are the same as in *robertsi*.

Skull: greatest length 163 mm. ; basal length 144; palatal length 86 ; zygomatic breadth 70 ; nasals 56 ; upper molar series 45.

*Distribution*. Nyasa (type from Chiromo, Shire River).

*Type*. Very old female. B.M. no. 11. 6. 16. 1. Collected by Major C. P. Bradshaw on the 27th October, 1910, and presented to the Natural History Museum.

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## XXXVIII.—*On the so-called new Tipulid Subfamily* Ceratocheilinæ, *Wesché*. By F. W. Edwards, B.A.

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On reading the late Mr. Wesché's paper (J. Linn. Soc., Zool. xxx. 1910, p. 358) in July of last year, the writer was struck by the resemblance of the figures of the rostrum of

the genus *Ceratocheilus* to what is found in *Toxorrhina*. No further notice was taken of this resemblance at the time, and no comparisons were made with the descriptions of *Toxorrhina*. Early in the present year, however, the writer had occasion to examine carefully Dr. Speiser's description of *Styringomyia cornigera* (Berlin. ent. Zeit. lii. 1907, p. 130), and a suspicion at once arose that this species was related to *Ceratocheilus*. This suspicion was confirmed by a re-reading of Wesché's paper, while an examination of the types in the British Museum showed that a considerable amount of confusion of names had arisen, which required clearing up.

The first thing that was evident from this examination was that the type specimens of *Ceratocheilus winnsampsoni* agreed so closely with the description of *Styringomyia cornigera* as to leave no room for doubting that the two names applied to one and the same species. The name *Styringomyia* is evidently wrongly applied to *cornigera*, for Loew in his original description of the genus (Dipt. Beit. i. p. 6) says "proboscis brevis," while the figures of the wing given by Loew and Osten-Sacken show a considerable divergence from the neuration of *S. cornigera*, though it is true there is a certain general resemblance. Fortunately the writer has seen a large number of recent examples of the last-named genus, and there is clearly no close relation between it and *Ceratocheilus*.

An examination was next made of the types of *Neoceratocheilus*, and it was found that in neuration and in the structure of the head, antennæ, thorax, legs, and abdomen there was nothing to separate this genus from *Toxorrhina*. The only noticeable difference is that in *N. grahami* the great cross-vein is placed before the base of the discal cell. This character cannot be regarded as generic, and is exhibited also by *T. cisatlantica*, Speiser. *Neoceratocheilus grahami* is evidently closely allied to *T. cisatlantica*, but differs in the dark halteres, those of the latter species being described as white. Wesché, in his description of *Neoceratocheilus*, omits to mention that the antennæ are twelve-jointed in both sexes (as in *Toxorrhina*), and he incorrectly states that the head has "a flat plate inserted at the dorsal base of the proboscis." This latter feature is peculiar to the genus *Ceratocheilus*; it is not found in the related genera *Toxorrhina* and *Elephantomyia*, nor in the genus *Styringomyia*; it is, in fact, one of the most important diagnostic characters of *Ceratocheilus*. This very remarkable structure has been well described by Speiser, who speaks of it as a *corniculus*;

Wesché also figures it. *Ceratocheilus* is further distinguished from *Toxorrhina* by the presence of a rudimentary second vein, and by the further reduction in the number of joints of the antennæ; from *Elephantomyia* by the form of the second vein and the number of antennal joints. The antennal joints are difficult to count, but in the male *Ceratocheilus* they appear to me to be 10 in number, not 8 as stated and figured by Wesché. There is no close relationship either with *Ptychoptera* or *Gynoplistia*, which Wesché suggested.

The discovery of the genus *Ceratocheilus* is of great interest as it affords a safe clue to the interpretation of the neuration of *Toxorrhina*. The second vein, already in a rudimentary state in the former, has evidently been completely suppressed in the latter genus, in which it is therefore not the submarginal, but the outer marginal cell which is absent. This explanation was suggested as a possible one by Osten-Sacken (Mon. Dipt. N. Am. iv. p. 112), who, if he had had the present material at his disposal, would doubtless have adopted it as the true one. The similar condition of the second vein in *Styringomyia* is probably due to parallel or convergent evolution, and not indicative of relationship.

All the known species of *Toxorrhina*, with the exception of *T. madagascariensis*, Meunier (Bull. Soc. Étud. Sci. Nat. Elbeuf, xxiv. 1906, p. 27), described from Madagascar copal, have hyaline wings, while the described *Ceratocheilus* have spotted wings. This suggests the possibility that *T. madagascariensis* may be a *Ceratocheilus*; the presence of a small second vein may easily have been overlooked. The fossil species of *Toxorrhina* (*Elephantomyia*) described by Loew may possibly belong to *Ceratocheilus*; but this is not probable. Osten-Sacken seems to think that they are true *Toxorrhina*; if Schiner was correct in saying that they possess a submarginal cell, they probably belong to *Elephantomyia*. A collection of Diptera in copal from the East African coast, in the British Museum, contains a number of specimens of *Elephantomyia*.

A short time after making the above discoveries the writer read Dr. Grünberg's description of his new genus *Idiophlebia* (Zool. Anz. xxvi. 1903, p. 527), and Dr. Speiser's of *I. crassicosta* (Berl. ent. Zeit. lii. 1907, p. 132), which seemed to apply to *Styringomyia*. Grünberg's description was compared with those of Loew and Osten-Sacken, with which it was found to tally completely. On looking through the accessions of Tipulidæ in the British Museum I found specimens of a *Styringomyia* from Burpengary, S. Queens-

land, collected by Dr. T. L. Bancroft, which were evidently *I. pallida*, Grünberg, while the single damaged specimen of *S. didyma*, Grimshaw ('Fauna Hawaiiensis,' iii. 1901, p. 10), seemed to belong to the same species. I wrote to Mr. Grimshaw suggesting the possibility, and he replied that he had for long believed that it was so; he also very kindly forwarded for my inspection a number of specimens of *S. didyma* received since the publication of his work. A comparison of these with the Queensland specimen and with the description of *I. pallida* removed all doubt as to their identity. This is the only known recent species of the genus (there are eight in the British Museum) in which the axillary vein is curved to the hind margin, not angulated. Grünberg points out distinctions in the neurations of *Idiophlebia* and *Styringomyia*, but these can really only be differences of interpretation and not of structure. The auxiliary vein, as noted by Grimshaw, is difficult to observe, and this would be quite sufficient to account for Loew's statement that it is absent; his specimens being enclosed in amber would naturally be even more difficult to examine. Loew's and Osten-Sacken's interpretation of the short vein connecting the first and third longitudinal veins as the terminal portion of the second seems nearer the truth than to call it, as Grünberg does, the marginal cross-vein. The first longitudinal vein can generally be distinguished along nearly the whole length of the wing, though it lies in close conjunction with the costa. Grünberg's figure has probably slightly exaggerated the distance between them. *Idiophlebia crassicosta*, Speiser, is a *Styringomyia*, and is more typical than *I. pallida*, as the auxiliary vein is less distinct and the subcostal enters into conjunction with the costal nearer the base of the wing. In this species, according to the author, "die ganze Flügelflache ist dicht behaart"; Dr. Speiser, writing to me concerning this, says he may have meant that the usual microscopic hairs on the membrane of the wing are a little longer than in other Limnobiidæ, but it is no hairiness such as one sees, for example, in *Psychoda*. The palpi of *S. didyma*, Grimshaw, are figured as being six-jointed; this is, of course, a mistake, for which that author is not himself responsible.

I take this opportunity to describe a new species of the genus *Ceratocheilus*, which is represented in the British Museum by a single specimen (♀) taken 12. i. 1905 by Lt.-Col. Giles at sea, 6° N., 20 miles from the West African coast.

*Ceratocheilus gilesi*, sp. n.

Head dark grey. Thorax and abdomen almost uniform brownish ochreous, thorax without distinct markings. Wings entirely unspotted, not even darkened on the cross-veins; discal cell open, coalescent with second posterior cell; great cross-vein slightly beyond base of second posterior cell; second vein somewhat straighter and shorter than in *C. cornigerum*.

Length of body 5·5 mm.; rostrum 5; wing 4·5.

The open discal cell and hyaline wings of this species render it very distinct.

Summary.

The following species have been noticed in the preceding paragraphs:—

1. *Ceratocheilus cornigerum* (Speiser).
   Syn. *Styringomyia cornigera*, Speiser (1908).
   *Ceratocheilus winnsampsoni*, Wesché (1910).
2. *Ceratocheilus gilesi*, sp. n.
3. *Toxorrhina* (?) *madagascariensis*, Meunier.
4. *Toxorrhina grahami* (Wesché).
   Syn. *Neoceratocheilus grahami*, Wesché.
5. *Toxorrhina cisatlantica*, Speiser.
6. *Styringomyia didyma*, Grimshaw (1901).
   Syn. *Idiophlebia pallida*, Grünberg (1903).
7. *Styringomyia crassicosta* (Speiser).
   Syn. *Idiopheblia crassicosta*, Speiser.

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XXXIX.—*Descriptions and Records of Bees.*—XXXVIII.

By T. D. A. Cockerell, University of Colorado.

*Megachile bicolor taiwana*, subsp. n.

♀.—Differs from Indian *M. bicolor* as follows: abdomen not so broad at base; hair of pleura entirely pale, slightly yellowish, the general effect being pale yellowish grey; no fuscous hair near base of wings above; ventral scopa a little reddish subapically.

*Hab.* Formosa ; one at Takao, July 26 (*Sauter*). Berlin Museum.

I previously recorded this as *M. bicolor*, but a renewed study, in comparison with the Indian form, indicates that it is subspecifically distinct. It looks like *M. rufovittata*, but, aside from the colour of the scopa, the clypeus is depressed in the middle and the shining supraclypeal area is more finely punctured.

*Megachile caldwelli*, sp. n.

♀.—Length about 17 mm.

Robust, black, with pale hair ; head broad ; sides of face and front with much white hair ; clypeus irregularly punctured, the punctures of different sizes, the middle depressed and more sparsely punctured, the apical margin broadly shallowly emarginate and depressed in the middle; supraclypeal area transversely obtusely elevated, with a shallow transverse median depression ; flagellum pale brownish beneath ; vertex rather densely punctured on a shining ground ; mesothorax with strong rather close punctures ; scutellum extremely densely punctured ; hair of thorax pale, but pleura with a very broad band of fuscous hair from the wings downward ; tegulæ dark castaneous. Wings reddish. Legs with pale hair ; middle femora broadly flattened behind ; inner side of tarsi with ferruginous hairs ; hind basitarsi very broad. Abdomen broad, hardly tapering, the hind margins of the segments rather narrowly ferruginous ; dorsal surface of abdomen covered with light ferruginous hair, and ventral scopa entirely of the same colour.

*Hab.* Foochow, China (*H. R. Caldwell*). U.S. National Museum.

In my table of Chinese *Megachile* (Trans. Amer. Ent. Soc. 1910, p. 212) this runs nearest to *M. mongolica*, which is a much smaller species. In Bingham's table of Indian species it runs nearest to *M. ardens*, which has black pubescence on the front and fuscous black on the legs ; or to *M. fulvovestita*, which has the clypeus carinate. The face and mandibles are constructed much as in *M. bicolor*. Superficially, the insect looks like the Formosan *M. takaoensis*, but the wings are not so dark, the clypeus and supraclypeal area are quite different, and the mandibles have a strong Y-shaped ridge, wanting in *takaoensis*. *M. caldwelli* may be said to combine the principal structural characters of *bicolor* with the appearance and colour of *takaoensis*. The larger size, white hair of face, less densely punctured mesothorax,

and absence of shining areas on the axillæ readily separate *caldwelli* from *rufovittata*.

*Caupolicana vestita* (Smith, 1879), var. *piurensis*, v. nov.

Professor C. H. T. Townsend has sent me four specimens, which he collected at Piura, Peru, April 28th, 1911, at flowers of an Asclepiadaceous climber, which is perhaps *Philibertella flava* (*Philibertia flava*, Meyen). Pollen-bodies of the Asclepiad adhere to the legs of some of the specimens. Smith's species was based on a male from Peru. The female is similar, about 15 mm. long. Fresh specimens have the hair on cheeks and underside of body very white, and my material has black legs, with only the tarsi of the males somewhat rufescent. As Smith definitely states that the tibiæ and tarsi are ferruginous in his insect, I regard the Piura form as a variety or race. In the female the middle and hind tibiæ and tarsi are black-haired on the outer side, but the hind tibiæ have abundant curled long white hair beneath. The hind tibiæ and tarsi are also black-haired on the inner side, and the large scopa of the hind femora is greyish black. Mandibles tridentate in female, bidentate in male ; lobes of tongue very long and pointed ; second s.m. about half size of third ; abdomen of female dorsally with brilliant orange-fulvous tomentum, at sides black (*i. e.* the surface visible) with broad white apical hair-bands, fifth segment with black hair, white at extreme sides ; male abdomen similar, fifth segment black-haired basally, with a broad white hair-band, and no fulvous except a slender longitudinal median line of hair, which may be absent.

*Trigona mellaria*, Smith.

Piura, Peru, at same Asclepiadaceous flowers as *Caupolicana vestita*, var. *piurensis*, April 28 (*C. H. T. Townsend*). At an earlier date males were sent, with the information that the species nests in mesquite trunks. The Peruvian specimens have been compared with a cotype from F. Smith's collection. The male differs from the worker by the much narrower face, with silvery white pubescence at sides, and has more light colour on the legs. The male hind tibiæ are largely pale yellow, marked with black and suffused with red. The species was described from Panama.

*Trigona townsendi*, sp. n.

Worker: about 2½ mm. long.

Compact, with short abdomen, black, nearly hairless; scape slender, ferruginous, dusky at apex, flagellum dark; mandibles rufous; face broad and flat; head and mesothorax dullish, finely sculptured; antennæ close together, a keel extends upwards from their base, changing to a groove on upper part of front; cheeks, metathorax, and pleura shining; tegulæ testaceous. Wings hyaline, with pallid nervures; stigma large, narrowly margined with dusky. Legs very dark fuscous, small joints of tarsi ferruginous; posterior tibiæ moderately broad. Abdomen smooth and exceedingly shiny. The following characters are seen with the compound microscope: mandibles edentate; malar space well developed, about 104 $\mu$ long; distance between antennal sockets hardly 100 $\mu$; front with a minutely cancellate sculpture; mesothorax very minutely cancellate, except at sides, where this sculpture gives way to coarse ridges directed toward the margin; scutellum more feebly subcancellate, the tendency being toward transverse markings; metathorax inflated, delicately cancellate, the well-defined polygonal areas about twice as large as those on mesothorax; width of hind tibia about 270 $\mu$; last antennal joint flattened and curved, rather spoon-like,

*Hab.* Piura, Peru, October (*C. H. T. Townsend*, 124). Resembles *T. schulthessi*, Friese, from Guatemala, but is smaller, with the thorax partly shining. *T. muelleri*, Friese, and *T. dutræ*, Friese, are easily separated by the shining head and thorax; and *T. schrottkyi*, Friese, by its white-haired face and absence of a distinct malar space. *T. fraissei*, Friese, is much more hairy.

*Xylocopa nitidiventris*, Smith.

*X. morawitzi*, Pérez, 1901, is a synonym, according to a note pencilled by Professor Pérez on my copy of his description.

*Xylocopa varians incarum*, subsp. n.

♀.—Similar to *X. varians ecuadorica*, Ckll., but differing as follows: scattered pale hairs of abdomen white (not golden); extreme sides of segments 2 to 4 with narrow but dense white apical hair-bands; the pale yellowish hair of legs of *ecuadorica* wholly replaced by hair of a fine deep copper-red. Tegulæ black, slightly reddish posteriorly.

Wings dusky hyaline, scarcely yellowish. Compared with a specimen of *ecuadorica*, the type of *incarum* is decidedly more robust.

♂.—Less robust; face narrow, with the clypeus, a broad supraclypeal mark, lateral face-marks (extending narrowly along orbits to level of anterior ocellus), greater part of labrum, stripe on mandibles, scape in front, and stripe on basal half of third antennal joint (the apical part in front red) all *white*; tarsi with much copper-red hair, and a line of the same on outer side of hind tibiæ, failing basally. Compared with the male *X. splendidula*, Lep. (Villa Encarnacion, Paraguay, *Schrottky*), this differs in being smaller; eyes smaller, much less converging above; labrum and mandibles with light marks; hair of pleura black; tarsi with much red hair, &c. It is at present uncertain whether *varians*, *ecuadorica*, and *incarum* should be regarded as closely allied species, or races of one (*varians*).

*Hab.* Piura, Peru (*C. H. T. Townsend*). The type (female) from flowers of water-melon in May; the male, April 28, at the same Asclepiadaceous flowers as *Trigona mellaria*, &c. The insect is dedicated to the Incas, who doubtless observed it in ages past.

*Xylocopa morio callichlora*, subsp. n.

♀.—Wings shining brilliant golden green, with slight coppery tints.

*Hab.* Piura, Peru, April 28, 1911 (*C. H. T. Townsend*). Pérez records what is evidently the same variety from Guayaquil. It is just possible that *X. frontalis quadrimaculata*, Meunier, from Quito, is its male. Dalla Torre's Catalogue erroneously gives Cayenne as the locality of *quadrimaculata*.

*Ptiloglossa ollantayi*, sp. n.

♀.—Length about 16 mm., anterior wing 11½.

Light rufo-fulvous, the head and thorax dusky above, the cheeks black; hind margins of abdominal segments broadly hyaline, with a greenish lustre; legs clear ferruginous; hair of head and thorax abundant, white on cheeks, pale yellowish on face (whiter at sides, where it is dense), broadly tipped with grey on vertex, on thorax fulvous, tipped with fuscous on dorsum, below wings, and at sides of metathorax; hair of legs pale yellowish; first abdominal segment with much erect pale fulvous hair, along hind margin strongly stained with fuscous; remaining segments

with pale depressed hair, very thin on second and third, but at apex becoming long and dense; no hair-bands; clypeus and labrum yellow, the clypeus flattened and shining in middle, hardly punctured; mandibles bidentate, ferruginous basally, dark apically; malar space very short; eyes very large, converging above; ocelli very large, in a very high triangle, the lateral ones almost touching the eyes; scape rather short, dusky reddish; flagellum dark above, redder but not light beneath, bright ferruginous at apex; third antennal joint very long; area of metathorax triangular, smooth, free from hair; tegulæ clear rufo-testaceous. Wings yellowish, nervures ferruginous, stigma obsolete; venation as in *P. matutina* (Schrottky); hind spur of hind tibiæ very long and slender, anterior spur thick at base, with a twisted linear end.

*Hab.* Piura, Peru, March 1911 (*C. H. T. Townsend*).

Named after the hero of the famous ancient Peruvian drama "Ollantay." A species without striking structural features, but readily distinguished by its fulvous colour, which makes it look like *Xenoglossa mustelina* (Fox). The eyes converge more above than in *P. matutina*. *P. eburnea*, Friese, from Peru, is readily distinguished by its dark tegumentary colours.

*Megachile piurensis*, sp. n.

♂.—Length about 12 mm.

Compact, with very short abdomen; intense black, with black hair, except as follows: clypeus and middle of face covered with pure white hair, in two tufts abruptly parted in the middle, one directed upwards, the other downwards (but sides of face with black hair); front and anterior sides of mesothorax with the hair obscurely greyish; a grey tuft in front of and beneath tegulæ; long white hair extending from anterior femora and trochanters behind; hair of abdomen wholly black; eyes dark reddish; facial quadrangle about square; antennæ slender, entirely black; mandibles rather broad; sides of upper part of front shining and finely punctured, vertex duller, more coarsely punctured; mesothorax and scutellum entirely dull and granular; tegulæ black. Wings fuliginous; anterior coxæ without spines; anterior tarsi simple, black-haired, the small joints with short glittering light hair on inner side; sixth abdominal segment descending, broadly excavated in the manner of a half-circle, the sides of the excavation long and pointed.

*Hab.* Piura, Peru, March 1911 (*C. H. T. Townsend*).

A striking species, closely related in structure to *M. saulcyi*, Guér. (*chilensis*, Spinola), though very distinct by the black hair and dark wings. In Vachal's table of males in 'Revue d'Entomologie,' 1908–1909, it runs to *M. tricincta*, Friese, except that the anterior legs have much pale hair behind. It is also easily separated from *tricincta* by the entirely black-haired abdomen. In Friese's table of males in 'Flora og Fauna,' 1908, it runs nearest to *M. argentina*, Friese, which is very similar, but has the flagellum somewhat broadened at end, and three teeth on each side of the incision at end of abdomen.

*Callomelitta picta*, Smith.

Melbourne, Victoria, June 26, 1892 (*French*). Froggatt coll., no. 102.

*Euryglossa hæmatura*, sp. n.

♀.—Length about 14 mm., anterior wing 8½.

Black, with very scanty pale hair, last two abdominal segments above and below bright ferruginous, with reddish hair. Legs very dark reddish, superficially appearing black, the inner side of tarsi with dense very pale yellowish hair. Head very large, quadrate; eyes moderately converging above; facial foveæ deep narrow channels; mandibles large, curved; labrum shining, depressed in middle; clypeus large, smooth and shining, with scattered small punctures; front closely punctured; vertex with large well-separated punctures; cheeks large, with punctures of various sizes; antennæ very dark reddish, the flagellum with a row of fulvous spots beneath; mesothorax and scutellum shining, with strong widely separated punctures; area of metathorax smooth; tegulæ dark reddish. Wings dusky, reddish; stigma and nervures brown; first r. n. joining second s.m. at a distance from base nearly equal to length of first t.-c.; outer margin of basal half of hind tibia strongly dentate; hind spur finely pectinate. Abdomen dullish, with a hardly noticeable greenish tinge.

*Hab.* Walcha, New South Wales, March 20, 1903 (*W. W. Froggatt*, 70).

Resembles *E. terminata*, Smith, but is very much larger.

*Euryglossa geminata*, sp. n.

♀.—Length about 9 mm.

Black, with very bright chrome-yellow markings, as follows: clypeus, transversely semilunar supraclypeal mark,

broad lateral face-marks (filling space between clypeus and eye, and ending squarely, hardly at all narrowed, at about level of upper part of antennal sockets), anterior lateral corners of mesothorax very broadly, scutellum, postscutellum, and a very large triangular mark (one side basal) on each side of second abdominal segment; cheeks (which are small), pleura, metathorax, legs, and basal part of abdomen obscurely dark reddish; face very broad; clypeus shining, with scattered unequal punctures; flagellum ochraceous beneath; front, vertex, and mesothorax dullish with a satiny lustre; tubercles very low down on sides of thorax; tegulæ piceous. Wings hyaline; stigma dark reddish, nervures lighter; first r. n. joining second s.m. at a distance from base hardly equal to half length of first t.-c.; anterior femora swollen, their tibiæ thick, with a light yellow stripe in front; middle tibiæ with a yellow spot near apex; hind spur with about six teeth; fifth abdominal segment dorsally with much dark fuscous hair; apical plate ferruginous, narrow-spatulate.

*Hab.* Cheltenham, Victoria, 1909 (*French*). Froggatt coll., no. 100.

A member of the *E. quadrimaculata* group, wholly distinct by the peculiar marking of the abdomen.

*Euryglossa calliopsella*, Ckll.

Two females are from Sydney, New South Wales, Nov. 29, 1910 (*W. W. Froggatt*, 128).

A male is from Sydney, Dec. 1, 1910 (*W. W. Froggatt*, 103). The male, not previously known, differs by the scape being yellow in front; flagellum thicker, and pointed at apex; frontal mark broadly rounded or convex above, and very broadly joined to supraclypeal; discal yellow stripes of mesothorax broad and dentate on inner side anteriorly, but rapidly narrowing, to fail posteriorly; anterior corners of mesothorax very broadly yellow; scutellum, axillæ, and postscutellum yellow; sides of thorax nearly all yellow, but a black band from wings to hind legs; trochanters, femora, and tibiæ bright yellow, anterior femora and tibiæ with a dusky mark behind, middle tibiæ dark brown on outer side, hind tibiæ outwardly broadly black. Abdomen black dorsally, with narrow yellow bands at bases of second and third segments; venter yellow, with hind margins of segments brown; extreme sides with yellow patches; apex tufted with fulvous hair, but dorsal hair of fifth and sixth segments black. The distance of the first r. n. from the base of second s.m. is variable.

## PROCEEDINGS OF LEARNED SOCIETIES.

### GEOLOGICAL SOCIETY.

March 8th, 1911.—Prof. W. W. Watts, Sc.D., M.Sc., F.R.S., President, in the Chair.

The following communication was read:—

'Contributions to the Geology of Cyrenaica.'
By Prof. J. W. Gregory and others.

(ii) Notes on the Kainozoic Mollusca. By Richard Bullen Newton, F.G.S.

The Author determines a number of mollusca which are recognized as belonging to various members of the Kainozoic System, namely, post-Pliocene, Helvetian-Tortonian or Vindobonian, Aquitanian, Priabonian, and Lutetian. The most abundant of the post-Pliocene series is *Cerastoderma edule*, a species largely distributed over Northern Africa and the Mediterranean countries generally. Among the Helvetian-Tortonian forms are *Alectryonia* cf. *virleti* and *Strombus* cf. *coronatus*—well known in North African rocks of this age, as well as in those of other Mediterranean regions.

The Aquitanian shells present a relationship to the 'Schioschichten' fauna of Northern Italy, and consist mainly of Pectinoid species, such as *Pecten vezzanensis*, *Æquipecten* cf. *pasinii*, and *Spondylus cisalpinus*, etc., associated with *Æquipecten zitteli*, *Æq. camaretensis*, and *Æq. scabrellus*, which are indicative of the later age—Burdigalian or Helvetian. This admixture of species, according to Dr. Oppenheim's memoir on the 'Schioschichten,' is also known in the fauna of those rocks. Foraminiferal organisms (*Operculina*, etc.) occur in these beds, but no nummulites. *Lepidocyclina elephantina*, a good Aquitanian species, is found with *Oopecten rotundatus* from Birlibah.

The most characteristic of the Priabonian mollusca is *Pecten arcuatus*, a species occurring in Northern Italy, the Balearic Islands, Algeria, Tunis, the Balkan Peninsula, Armenia, etc. A new species of *Æquipecten* is described. Nummulites abound in these rocks.

An indeterminable ostreiform shell has been collected in the neighbourhood of Ain Sciahat, associated with the large *Nummulites gizehensis*—thus demonstrating that Lutetian rocks are present in Cyrenaica. So far as the mollusca are concerned, nothing older than Lutetian has been observed in this collection.

(iii) Foraminifera, Ostracoda, and Parasitic Fungi from the Kainozoic Limestones of Cyrenaica. By Frederick Chapman, A.L.S., F.R.M.S.

This paper describes the foraminifera, ostracoda, and a parasitic fungus found in the limestones of Cyrenaica. The foraminifera are mainly from the Middle Eocene; others belong to the Upper Eocene, and to the Aquitanian or Stampian. The most abundant foraminifer is *Nummulites gizehensis*, which is represented in the Derna Limestones by its typical form, and is there associated with the typical form and a new variety of *N. curvispira*. At a higher horizon below Ain Sciahat and in the Slonta Downs is a nummulitic limestone containing *N. gizehensis*, var. *lyelli*.

Some limestones at Wadi Umzigga contain *Lepidocyclina elephantina*, and are referred to the Aquitanian or Stampian.

Further details are given of the structure of *Orthophragmina pratti*. A new species of *Loxoconcha* is described. The boring fungus *Palæachyla perforans* occurs perforating *Lepidocyclina*.

(iv) The Fossil Echinoidea of Cyrenaica. By John Walter Gregory, D.Sc., F.R.S., F.G.S.

The Echinoidea collected in the journey across Cyrenaica are referred to ten species, of which two are new and one is a new variety. The echinoids come from four horizons: the oldest fauna belongs to the Middle Eocene; the Upper Eocene or Priabonian fauna is represented by an unusually early species of *Amphiope*, and by an *Echinolampas* which is widely distributed through the country and is referred to the Priabonian *E. chericherensis* Gauth. Some echinoids from the Cyrene Limestones are of Aquitanian affinities, and others seen in the limestone east of Benghazi are Miocene. The affinities of *Hypsoclypeus hemisphericus* (Greg.) are considered. The echinoid faunas show that the Eocene rocks containing them were, as a whole, deposited in a sea of moderate depth. The Miocene strata were formed in comparatively shallow water.

(v) The Foraminiferal Limestones of Cyrenaica. By David Paterson MacDonald, M.A., B.Sc.

The microscopic examination of the limestones of Cyrenaica shows that they are all mainly composed of organic material, and are remarkably free from detrital material. The rocks were laid down under conditions of quiet sedimentation. Some of them have been partly dolomitized. The chalky limestones near the base of the series have been deposited at the greatest depth. The commonest organisms present are foraminifera, echinoderms including holothurian plates, mollusca, and calcareous algæ, which in some specimens form more than half of the whole rock. Some of the limestones are oolitic.

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No. 45. SEPTEMBER 1911.

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XL.—*The Skull of* Diademodon, *with Notes on those of some other Cynodonts.* By D. M. S. Watson, M.Sc., the Victoria University of Manchester.

Our knowledge of the skull of Cynodonts dates from 1860, when Owen described the type specimen of *Galesaurus planiceps*; but our more detailed information depends almost entirely on the description by the late Prof. H. G. Seeley of the wonderfully perfect skulls of *Gomphognathus* and *Cynognathus*, which were developed by Mr. R. Hall of the British Museum under his supervision. More recently Dr. R. Broom has added something to our knowledge by amending some of Seeley's descriptions and by the description of some new specimens. Quite recently W. K. Gregory, in his excellent work 'The Orders of Mammals,' has published a figure of the under surface of a *Cynognathus* skull drawn from a plaster cast, with the assistance of figures published by Seeley and Broom; he has added to this a clear discussion of its structure, and his description may be regarded as a summary of what is actually known.

Amongst the specimens obtained by Seeley in South Africa, which are now in the British Museum, is a small skull (R. 3587) from Winnaarsbaken in Cape Colony belonging to the genus *Diademodon*. This skull, which is almost completely undistorted, is preserved in a matrix of liver-coloured micaceous shale, passing occasionally into a

purple and green cornstone much resembling some of those found in the Herefordshire Old Red Sandstone. This matrix is comparatively easily removed, and Prof. Seeley cleared the whole left temporal fossa and orbital cavity and part of the palate. I have recently further developed the specimen, removing the matrix surrounding the base and back of the skull and exposing the teeth, the right quadrate, and the posterior part of the right side of the brain-case.

This very complete development, with the fact that almost all the sutures are clearly shown, enables me to correct some accepted statements and determinations, and to add a good deal to our knowledge of the more intimate details of its structure.

I have thought it best to give a connected account of the structure of the skull, instead of merely pointing out the new features recognizable in it, because Prof. Seeley's descriptions, although, so far as I have personally compared them with his material, perfectly accurate, are very difficult to follow without the actual specimens or casts of them at hand.

### *Description of the Skull* R. 3587.

The skull agrees exactly in general characters with that of *Gomphognathus*, and I refer it to *Diademodon browni*, Seeley. I can see no reasons for generically separating *Gomphognathus* from *Diademodon*. The skull lacks the anterior end, probably some 3 or 4 centimetres being missing.

### *General account of the build of the Skull.*

Viewed from above the skull is triangular in shape, the widest part being at the extreme back across the squamosals. The orbit is of medium size, placed about the middle of the length of the skull, and facing outwards and partly upwards and forwards. The postorbital bar is robust and nearly horizontal in position, and the frontal width is only about $\frac{1}{3}$ of the entire width of the skull in the middle.

The temporal fossæ are large and are separated by the very high and narrow sagittal crest. Posteriorly this crest divides into two branches, which spread outwards and pass backwards at an angle of about 90° with one another. These ridges rapidly drop towards the lower side of the skull as they pass outwards, and form the inner sides of a pair of shallow but well-marked grooves, placed almost vertically on the back of the skull. The outer sides of these grooves are formed by the zygomatic arches, which rise *pari passu* with the occipital crest as they are traced forwards.

In the middle of the parietal crest is a very small laterally compressed pineal foramen. The brain-case in this region is narrow even for a reptile, but it widens posteriorly.

The most striking characters of a side view of the skull are the depressed form and the fact that the upper surface is almost flat and parallel to a line joining the teeth to the articulation of the lower jaw.

The lower border of the orbit is carried out on a rim, below which the side of the face is depressed. In front of the orbit is a small lachrymal foramen, and still further forward two small foramina running into the maxilla

The zygomatic arch is very deep and below the back of the orbit is carried down as a powerful process which projects a little outwards from the side of the face.

Posteriorly the zygomatic arch is marked by the presence of a wide smooth groove leading backwards on to the posterior surface of the skull.

The posterior surface of the skull consists of a median and two lateral regions; the median region is triangular, the base being nearly straight and equal to about twice the height.

Projecting from the back at the lower border are the two occipital condyles; they are small, very small in proportion to the size of the skull, and well separated by a median U-shaped notch; they are not very well preserved.

Lying above the condyles is the small, almost circular foramen magnum, which was originally surrounded by a raised rim, notched just above the condyle to form a groove for the passage of the twelfth nerve.

Placed laterally at about the level of the top of the foramen magnum are two small openings, well separated from the middle line; they are the representatives of the post-temporal fossæ. The whole of the back below and between these fossæ is, viewed broadly, flat; outside them the area is bounded by two deep backwardly turned flanges. Above the foramen magnum the back of the skull is excavated into a wide open basin, bounded on each side by the continuations of the flanges which form the lateral borders of the lower part of the area and by their union form the parietal crest.

The lateral areas are separated from the median area by deep V-shaped notches, which end below in the well-defined nearly vertical groove spoken of in describing the upper

surface of the skull. This groove inclines slightly outwards at its lower end.

The whole of the lateral part of the posterior surface is formed by the base of the zygoma, and consists of an outer area curved from above downwards but flat from side to side, which forms the anterior wall of the groove spoken of in describing the side view. The inner and posterior sides of this groove are formed by a powerful flange of bone, whose other face forms the outer side of the V-shaped notch separating the median from the lateral part of the occipital plate.

The most striking feature of a ventral view of the skull is the small size of the palate. The posterior nares are of very large size, being both wide and deep; they are bounded below by the posterior edges of the secondary palate, which is formed by the ingrowth of ridges from the almost vertical anterior plates of the palatines.

The two rows of flattened teeth are nearly parallel anteriorly, but separated widely on each side of the posterior nares. The hinder border of the secondary palate is continued by a ridge which passes backwards to the level of the last molar, where it subsides into the general level; just external to it at this point is a small suborbital foramen. In this region the teeth are carried down on a ridge of the maxilla below the general level of the palate. Just behind this region are two enormous descending flanges, with flat outer surfaces, which during life were closely applied to the inner surface of the lower jaw.

Between the flanges the palate is divided into three grooves, separated by rounded ribs. These ribs approach one another as they are traced backward, becoming at the same time more distinct and narrower, and finally ending between the descending flanges in a pair of well-marked processes.

The median groove is divided by a thin rib, which rises in front to become a deep but still very slender plate, partially dividing the posterior nares. The two lateral grooves each contain a small foramen.

Behind the flanges the palate becomes very narrow, forming a bar bearing on its lower surface a strong ridge which separates two small grooves which lead anteriorly into the lateral channels of the palate.

On the outside of these grooves lies a pair of rounded

hollows which run along the ridge backwards until they are suddenly terminated by deep fossæ.

The median ridge continues backwards until, at a point about halfway to the occipital condyles, it suddenly widens and splits into two, which form the lateral borders of a triangular area bounded behind by the occipital surface of the skull. This area is somewhat depressed on each side of the middle line, and its postero-lateral angles are excavated by very deep pits.

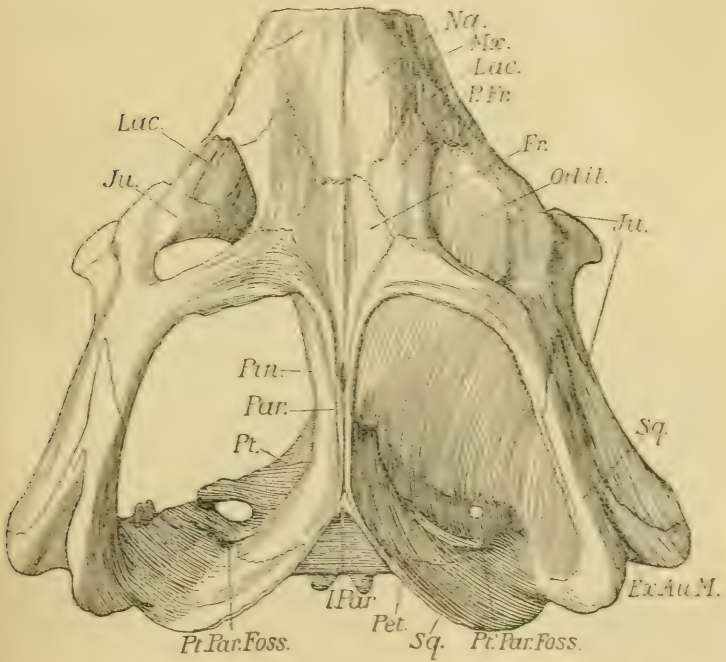



Fig. 1.—*Diademodon browni*. R. 3587. Upper surface. × 1. *Dg.*, digastric groove; *Ex.au.M.*, external auditory meatus; *Fr.*, frontal; *I.Par.*, interparietal; *Ju.*, jugal; *Lac.*, lachrymal; *Mx.*, maxilla; *Na.*, nasal; *Par.*, parietal; *Pet.*, petrosal; *P.Fr.*, prefrontal; *Pin.*, pineal foramen; *Pt.*, pterygoid; *Pt.Par.Foss.*, pterygoparoccipital foramen; *Sq.*, squamosal.

On each side in this region is a deep fossa opening anteriorly into the brain-cavity, and passing outwards laterally to terminate at the beginning of the great smooth groove on the root of the zygomatic arch. This fossa is the tympanic cavity.

*Structure of the Skull.*

The basioccipital and basisphenoid are so fused that the suture between them cannot be seen (fig. 3).

The basioccipital part of the combined bone is probably very short; it is thin from above downwards, and its lateral borders are indistinguishably fused with the exoccipitals. These latter bones are fused with the periotics, which form one mass of bone in which no sutures are visible.

The foramen magnum is surrounded by bone in which no sutures are to be seen. The sutures separating this ring from the surrounding bones are, however, quite clear (fig. 4).

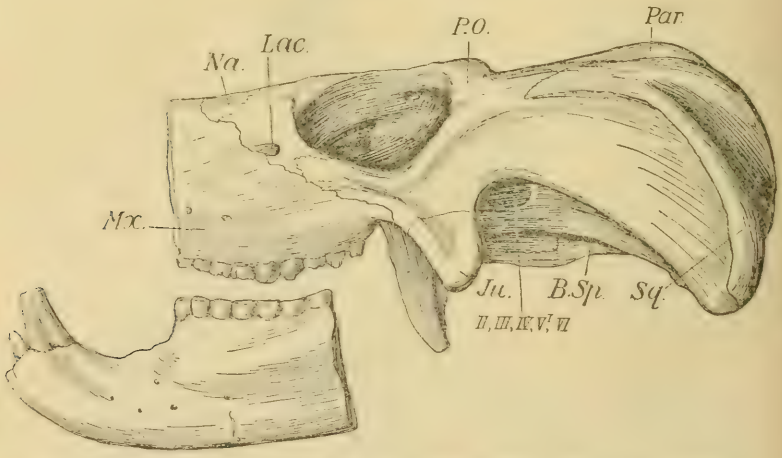



Fig. 2.—*Diademodon browni*, R. 3587 and R. 3588. Side view. References as in fig. 1, with VII-III, foramen for exit of second and third branches of the V. nerve; II, III, IV, VI, VI, notch for the exit of these nerves.

The paroccipital processes, presumably belonging to the opisthotics as in *Sphenodon*, form the lower part of the back of the skull; their ventral border is nearly straight, but dips down somewhat at the outer ends. Their posterior surface is flat, and they are bounded above by a notch which forms the lower border of the very small post-temporal fossa; on the inner side of the notch they are united by jagged suture with the parietals. The paroccipital processes are of triangular section, their forward face being excavated by a groove which forms the posterior wall of the tympanic cavity (fig. 3).

The outer end of the process is expanded and strongly united with the squamosal by a wide (flat?) face; on the back of the skull it is also touched by a descending plate from the parietal, which passes down on the inner side of the squamosal behind and outside the small post-temporal fossa (fig. 4).

Fig. 7. Fig. 3.

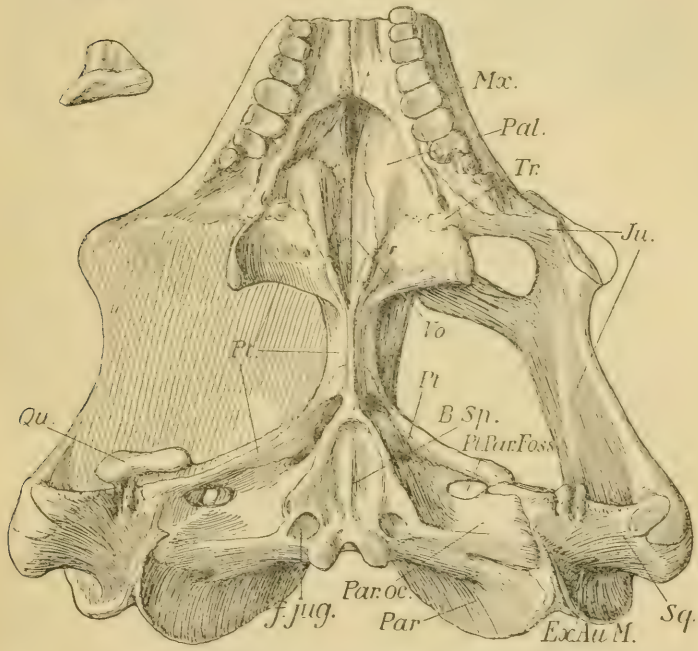



Fig. 3.—*Diademodon browni*, R. 3587. × 1. From below. References as in figs. 1 and 2, with, in addition: *f.jug.*, foramen jugulare; *Par.oc.*, paroccipital process; *Pal.*, palatine; *Qu.*, quadrate; *Vo.*, vomer.

Fig. 7.—*Diademodon browni*, R. 3587. × 1. Right quadrate from in front.

The supra-occipital is not separated from the exoccipitals, but no doubt forms the upper border of the foramen magnum. Articulating with its upper edge by a jagged suture is the interparietal; this, so far as it can be seen, is a thin squamous bone bent along its mid-ventral line and lying wedged in between the posterior flanges of the parietals; it forms a large area of the median division of the back of the

Fig. 4.

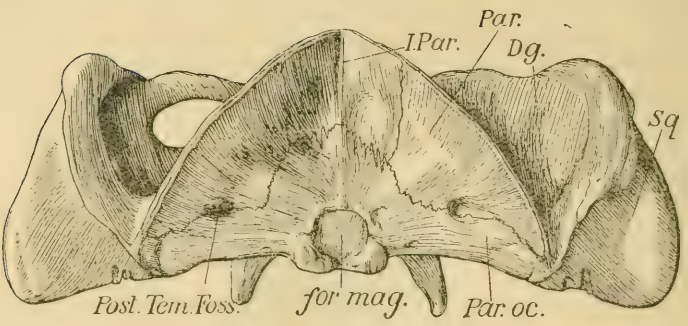



Fig. 6.

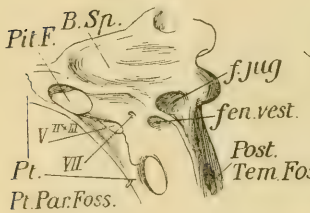
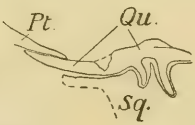



Fig. 8.



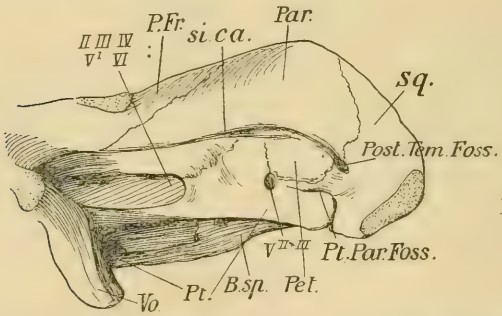




Fig. 5.

Fig. 4.—*Diademodon browni*, R. 3587. × 1. From the back. References as in the preceding figures, with: *for.mag.*, foramen magnum; *Post.Tem.Foss.*, posterior temporal fossa.

Fig. 5.—*Diademodon browni*, R. 3587. Side view of brain-case, the zygoma being supposed removed. *si.ca*, "sinus canal."

Fig. 6.—*Diademodon browni*, R. 3587. × 1. Right tympanic cavity from below and the right. *B.Sp.*, basisphenoid; *fen.vest.*, fenestra vestibuli; *Pit.F.*, pituitary fossa.

Fig. 8.—*Diademodon polyphagus*, type specimen. Left quadrate and surrounding bones from below

skull, and also appears as a small arrow-head-shaped bone at the extreme back of the parietal ridge in a dorsal view of the skull (fig. 1).

The two parietals appear to remain distinct in the skull under consideration; they unite in a sagittal suture along the posterior half of the parietal crest which separates the great temporal fossæ; anteriorly they separate very slightly and form the pineal foramen; it appears probable that their anterior ends were separated by very narrow laminæ of the frontals, and terminated some 3 or 4 millimetres in advance of the foramen, but this is not quite certain (fig. 1).

For about 1 centimetre behind the pineal foramen the parietal is supported on its outer face by a very thin and quite shallow splint of postfrontal (fig. 5).

The parietal in this region is a gently curved plate of bone falling down on the side of the brain-cavity until it meets the upper border of the columella cranii in a very long suture; it appears to be certain that this union extends forwards quite to the back of the orbit, passing forwards well underneath the frontal. Along or just above the junction of the parietal and columella lies a deep well-rounded groove, the anterior part of which is, when perfectly preserved, covered by a thin lamina descending from the parietals. At a point about 1 cm. behind the pineal foramen this groove receives a large oval and backwardly directed foramen, which must lead into the brain-cavity; this foramen appears to be bounded below by the columella and pro-otic. Behind this region the parietal is formed by a very thin, almost flat plate which passes outward and backward. The upper part of this plate is supported behind by the interparietal; lower down it is freely exposed on the posterior surface of the skull and is united by suture with the supra- and exoccipitals; it forms the upper border of the small post-temporal fossa, and sends down a thin flange outside the fossa in contact with the distal end of the paroccipital process (fig. 4).

On the outer face this plate is overlapped by a thin process of the squamosal which runs forwards to within $1\frac{1}{2}$ cm. of the junction of the sagittal and coronary crests. On its anterior face this plate is seen to unite with the pro-otic part of the periotic as far back as the post-temporal fossa; along this junction it bears a deep rounded groove, continuing that found further forwards; this groove opens into the post-temporal fossa (fig. 5). The free edge of the parietal along the sagittal and coronary crests is marked with small muscle

insertions pointing forwards and downwards into the temporal fossa, and its surface bears faint furrows with the same trend.

The periotics and basisphenoid are not separated by recognizable sutures, and are therefore almost necessarily described together.

The under surface of the basisphenoid is slightly concave; it bears a low median ridge and also two curious and feebly marked pits which do not appear to lead into foramina (fig. 3).

At the extreme back the basisphenoid, with the periotic, exoccipital, and basioccipital, forms a large deep pit on each side; these pits are provided with a small channel leading outwards and downwards, and also receive at least two foramina—a large foramen leading upwards and presumably opening into the brain-cavity directly, and a very small foramen which opens into the pit at the back just in front and rather to the outside of the occipital condyle; this last foramen appears to traverse the very thin lamina of exoccipital which forms the posterior wall of the pit at this point, and open by a minute foramen just outside the condyle.

It is probable that the large foramen is further divided, but the matrix filling the cavity is too hard to admit of further development.

The outer wall of this pit is thin and forms part of a more or less vertically placed area (fig. 6). This area is divisible into two—a small oval space, whose long axis lies almost horizontally but slightly depressed in front, which forms a deep hollow whose bottom is penetrated by a small nearly circular foramen, less than 2 mm. in diameter, which can only be the fenestra vestibuli seu ovale.

The other part of the area is rather more vertically placed, lies dorsal to the oval space, and is not well preserved.

The whole area is separated by a very distinct rectangular corner from the smooth, concave, cylindrical face of the paroccipital process.

In front of this area the basisphenoid and the periotic form a smooth vertically placed face, inclining strongly inwards anteriorly; this face is pierced by a foramen just in front of the area surrounding the fenestra vestibuli. This very small foramen can only have transmitted the seventh nerve. The anterior border of this vertical face is made by a deep notch, above which the bone is continued as a long process (fig. 6). This notch is undoubtedly the hypapophysial fossa, for the pituitary and the internal carotids no doubt entered

by its freely open sides. Anteriorly to the pituitary fossa the basis cranii is continued by a very thin deep plate (now pierced in the specimen by an artificial hole) which is visible for about 1 cm.

The long upwardly directed processes are either exaggerated posterior clinoid processes—an interpretation which is supported by a specimen of *Cynognathus* described later on —or they are homologous with the processi anteriores inferiores of the pro-otics of *Sphenodon*.

Outside the foramen for the nervus facialis the periotic bears a strong process which articulates by a suture with the posterior ramus of the pterygoid ; this process has a notch anteriorly and interiorly and another posteriorly and externally ; the anterior of these notches is not completed into a foramen, but the posterior forms, with the paroccipital process, the pterygoid, and a small process of the squamosal, a comparatively large oval foramen, the pterygo-paroccipital foramen (fig. 3).

Rising from this pterygoid process of the periotic is a plate of bone which unites above with the parietal and is provided with a thin lamina which covers the groove already described lying at or near the junction of these two bones. Posteriorly this bone passes directly into the anterior face of the paroccipital process, which is somewhat excavated, so as to form a wide groove leading from the pterygo-paroccipital foramen to the post-temporal fossa. This groove is roofed in front by a thin process which arises from the outer face of the periotic and passes backwards and outwards as a continuation of the covering of the parieto-periotic groove to meet a similar process of the squamosal.

The anterior border of this pro-otic part of the periotic has a sutural union with the posterior border of the upper part of the columella cranii, from which it is separated lower down by a foramen ; this foramen, the posterior border of which is formed by a notch, the incisura pro-oticum of the periotic, must have transmitted one or more branches of the V. nerve; its posterior border is smooth, and leads into a groove which passes backwards and outwards to the pterygo-paroccipital foramen ; this groove is roofed by a thin lamina from the periotic, which joins with that which covers the groove between the pterygo-paroccipital foramen and the post-temporal fossa (fig. 5).

The whole of this system of laminæ covering grooves is perfectly preserved on the right side of the skull, but has been destroyed on the left side, so that the grooves themselves are visible.

The front part of the basisphenoid has been described as an exceedingly thin but deep plate; somewhat further forward this plate swells out and forms two powerful processes; its lower part is rather broader posteriorly, but in this region contracts so as to form a narrow ridge rising above the table formed by these processes (figs. 3 & 6).

These processes are flattened and at least 1 cm. long; they give attachment to the pterygoids, and from their outer and posterior corners send back long slender splints which lie on the inner sides of the posterior rami of the pterygoids.

Anteriorly the thin ridge on the lower surface is continued into the vomer, which has a thin dorsal ridge almost certainly directly continuous with the thin part of the basisphenoid in advance of the pituitary fossa; there is a gap of 4 mm. in which this ridge is not exposed.

*Pterygoid.*—The pterygoid is a large triradiate bone which is separated from its fellow of the opposite side by the vomer and basisphenoid, and is conveniently divided into two parts for descriptive purposes, the part behind the basisphenoidal articulation and that before (figs. 3, 5, & 6).

The posterior part consists of the posterior ramus and the ascending plate which forms the columella cranii (fig. 5).

The posterior ramus is a very thin (about ·5 mm.) plate of bone extending back parallel to the antero-lateral face of the combined basisphenoid and periotic; it is supported anteriorly by the posterior process of the buttress of the basisphenoid, and further back by the process of the periotic which has already been described (fig. 3).

Laterally this bone passes out to the quadrate, and is separated from the paroccipital process by a thin inwardly directed process of the squamosal. This ramus forms the anterior wall of the tympanic cavity, the roof of which is pierced by the large pterygo-paroccipital foramen and by the deep fossa lying between the posterior ramus of the pterygoid, the pterygoid process of the basisphenoid, and the body of that bone; this fossa opens directly into the brain-cavity both laterally through the pituitary fossa and dorsally; at its posterior end its outer wall is pierced by the foramen for the V.$^2$ nerve.

Rising directly from the upper edge of the posterior ramus is the ascending plate, a broad thin lamina of bone articulating above with the parietal; it is slightly damaged by a vertical crushing in the specimen (fig. 5). The upper border of this plate is almost straight and of great length. The anterior border has a deep wide notch near its lower edge,

presumably transmitting the II., III., IV., V.[1], and VI. nerves. The posterior border of the bone unites above with the periotic, but is separated from it lower down by the foramen for nerves V.[2] and V.[3]. It is noteworthy that this ascending plate, which forms so large a part of the wall of the brain-cavity, has no direct connexion with the basis cranii, but is solely supported by the posterior ramus of the pterygoid. One would have expected this plate to have been separated by a suture as a separate epipterygoid, but there is no trace of such a suture in this skull, in the type of *Gomphognathus polyphagus*, Seeley, or in the type of *Cynognathus crateronotus*, Seeley; and if it were present one would expect to see traces of it in, at any rate, the last of these.

In the Chelonia an epipterygoid is sometimes present and sometimes absent, showing that it is a bone which is easily functionally replaced by a process of the pterygoid.

The anterior ramus of the pterygoid passes forward and becomes widely separated from its fellow by the vomer, which is suturally connected with its inner edge; laterally it expands and forms the great pterygoidal flange (fig. 3). Its anterior border is formed by a sutural union with the palatine, which runs transversely outwards until it meets the short and not very closely knit suture for the transverse bone; finally, the pterygoid is produced into a powerful process, which scarfs on to the dorsal surface of the palatal process of the jugal.

The pterygoid is pierced by a small foramen internally to the pterygoidal flange.

This ramus of the pterygoid passes backwards to join the posterior ramus, and forms a thin film veiling the sides of the basisphenoid-vomerine ridge; the suture separating the two bones is plainly seen posteriorly and the whole length of the suture is shown in one of Seeley's *Gomphognathus* skulls. The upper border of the bone forms a sharp ridge, which continues the anterior border of the ascending plate. This ridge stands up dorsally and with the central dorsal ridge of the vomer forms a deep well-defined channel.

*Squamosal.*—The squamosal is a very large bone which has a powerful articulation with the end of the paroccipital process (figs. 3 & 4); dorsal to this it forms a long thin tongue tightly pressed to the outer and anterior face of the parietal (fig. 5); this process terminates in front in a point.

This tongue is continued down below the articulation with the paroccipital process as a flange standing out behind it; its continuation on the ventral surface forms a low ridge just outside the paroccipital process (fig. 3). External to this ridge lies a large smoothly rounded groove which begins at a roughened ridge crossing the bone just outside of the paroccipital process, and curves upwards, outwards, and as it approaches the top of the skull forwards, until it issues on the side of the skull towards the top.

The anterior border of the groove is formed by a moderately stout plate of bone, which gives rise to a small inwardly directed process separating the end of the paroccipital process from that of the pterygoid (fig. 3). This plate of bone, whose lower border is straight and horizontal in position, bears two deep notches below, and has a triangular depression on its anterior face; these features are connected with the fixation of the quadrate.

External to the outer and larger of the two notches the lower surface of the bone is very strongly roughened and the thin lower edge of the plate expands and is split for articulation with the jugal. This plate, which carries the quadrate, is continued upwards and forwards, being closely united with the jugal until it ends about 1 cm. behind the orbit in a point received in a deep groove in that bone.

Outside the extreme posterior end of the jugal is another flange, forming the outer border of the groove on the squamosal; this surrounds the posterior side of the jugal, which is thus wedged into a slit in the former bone.

The anterior face of the splint of squamosal, which runs forward along the parietal, gives off a thin lamina, which unites with the similar process of the periotic to cover the groove leading from the pterygo-paroccipital foramen to the post-temporal fossa.

*Jugal.*—The jugal is a very large bone which forms a large part of the zygoma; it is surrounded by the squamosal above and behind, and its extreme posterior end is of triangular section and is received in a slit in the squamosal (figs. 1 & 2). At the anterior end of the zygomatic arch it is produced outwards and downwards in a powerful process.

The jugal apparently forms at least half of the border of the orbit, running forward beneath it until it is overlapped and suturally united with the lachrymal. This anterior part of the jugal is united by a jagged suture with the maxilla along the whole of its lower border; it sends a palatal process

inwards which is bounded by the maxilla, transverse bone, and very slightly by the pterygoid in a ventral view, but is largely covered by the pterygoid dorsally (fig. 3).

How much of the postorbital bar is formed by the jugal is uncertain.

*Ectopterygoid.*—The transverse bone is a very small L-shaped bone, united by a rather loose suture with the pterygoid, bounded laterally by the jugal and anteriorly by a short contact with the maxilla and a rather longer one with the palatine.

Its inner border at the corner of the L forms the outer and posterior edges of the very small suborbital foramen; the rest of the lower limb of the bone is joined by the palatine.

The bone appears to be completely overlaid dorsally by the pterygoid.

*Palatine.*—The palatines are widely separated from one another by the vomer (fig. 3). Each may be described as consisting of two parts, the main body of the bone and the secondary plate. The body of the bone is an almost vertically placed plate of bone united below to the vomer and forming the side wall of the great canal of the posterior nares. The postero-lateral corner of this plate is reflected upwards so as to be nearly horizontal in position, and unites with the pterygoid and transverse bone. The lower border of this bone stands up as a ridge lying parallel to and just within the teeth; it is continuous with the posterior border of the secondary plate of the palatine. The secondary plates of the palatines form together the floor of the narial passage, and their posterior borders meet at a circular angle of about 100°.

The scondary plate bears a patch of very small irregular granules which appear to have enamelled tips; these lie near the middle line and towards the back. There seems to be little doubt that these granules are homologous with the palatal teeth described by Seeley in *Cynognathus*. The secondary plates of the palatines unite in front with the similar plates of the maxillæ, but I cannot be certain of the sutures.

*Maxilla.*—The maxillæ are broken off anteriorly, but their posterior relations are well shown. Each consists of a massive alveolar part which receives the roots of the molar

teeth, a thin plate forming part of the side of the face, a secondary palatal plate and a small ascending process within the orbit (fig. 2).

The alveolar part is supported internally by the vertical plate of the palatine as far back as the transverse bone; just in front of this last bone its inner edge turns outwards, has a short contact with the transverse and an extensive one with the palatal process of the jugal. The facial part of the bone does not enter into the rim of the orbit, but is connected by sutures with the jugal, lachrymal, præfrontal, and nasal. It is pierced by two small foramina opening forwards and outwards; these apparently represent the pre-lachrymal foramen of mammals.

The inner edge of the alveolar part of the bone in its anterior half sends inwards a secondary plate similar to, and united with, the secondary plate of the palatine.

The inner edge of the dorsal surface of the alveolar part of the maxilla, just in front of and within the orbit, seems to send up a small process to meet a corresponding process from the præfrontal; it is, however, just possible that this process really belongs to the palatine.

*Dentition* (fig. 3).—The dentition is of the type of that of *Diademodon* or *Gomphognathus*. All the teeth preserved belong to the molar series, which is incomplete. On the left side nine teeth are preserved, which I shall number 1–9, the first being in front.

I object to the division of the molar series of Gomphodonts into premolars and molar, because premolar teeth in mammals are, by definition, those which follow milk-teeth, and probably belong to a later series than the permanent teeth. There is no evidence whatever of tooth-change in the molar teeth of Cynodonts.

Teeth 1–3 are all of similar character; their crowns are oval, nearly as long as they are wide, very closely pressed together and worn to a smooth gently convex surface.

Tooth 4 is best preserved on the right side. It is broadly oval, being 8 mm. across and nearly 5 long. The whole centre of the crown of the tooth is worn down into a wide longitudinally running groove, which is bounded both externally and internally by a pair of somewhat broken cusps.

The 5th tooth is, with the exception of the inner cusp, well preserved on both sides; it closely resembles 4, but the outer cusp forms a ridge along the outer border of the tooth, which shows faint indications of division into a number of small crenations.

The 6th tooth, best preserved on the left side, is longer and narrower than the 5th; it has a tendency to a triangular section, being rather shorter on the inner side than externally.

The outer cusp borders the usual groove and posteriorly is provided with two very small crenations. The posterior surface of the cusp on the right side shows a groove continuing a very deep notch in the succeeding tooth: this groove is placed vertically and faces directly backwards.

The 7th tooth has a very powerful external cusp, which gives origin to a ridge running across the tooth to a low cusp on the inner edge. In advance of this ridge the tooth has a well-marked furrow, which is the continuation of that on the posterior side of the 6th tooth.

Behind this ridge and somewhat to the outer side of the tooth is another furrow, pointing backwards and standing nearly vertically; this groove furrows the outer cusp on its posterior surface.

Tooth 8 has a very strong cusp on the outer side, continuing the curve formed by the outer pair of the anterior teeth; from this cusp, which has a powerfully crenated posterior edge, a very small lobe projects inwards. This lobe is worn downwards so as to continue the groove at the back of tooth 7. This groove has only an outer wall formed by a worn surface on the strong upstanding outer cusp. The inner lobe is restricted to the front of the tooth and gives it a triangular section.

The last tooth, best preserved on the right side, has a high, powerful, strongly crenated and backwardly bent cusp, which shows no sign of wear; on the inner surface of this cusp a very small inner cusp also unworn, and at the back an equally small posterior cusp.

The form and direction of the worn grooves on these teeth strongly suggest that there was some slight rodent-like longitudinal motion of the lower jaw. Seeley, from the study of the very similar but less well-preserved dentition of *Gomphognathus polyphagus*, had already reached the same conclusion.

*Vomer* (fig. 3).—The vomer forms the roof of the narial

passage and by a deep but very narrow median ridge partially divides the posterior nares ; its lateral borders are joined by the palatines, and further back by the pterygoids ; the sutures separating these bones from the vomer run along anteriorly just below and within the summits of the rounded ridges which mark out the median area of the palate ; posteriorly the sutures cross these ridges and are lost. The dorsal surface of the vomer has a strong but very narrow median ridge, which is directly continuous with the ridge of the front part of the basisphenoid.

*Quadrate* (figs. 3 & 7).—The right quadrate is well exposed from in front, below and partly from behind. It consists of a thin vertical plate received in the triangular hollow on the front face of the squamosal. This plate has a thickened lower border which is the actual articulating surface ; it is marked by a low and obscure ridge towards the outer side.

This plate carries two backwardly directed processes, each a thin vertical plate, the outer, which is situated very near to the extreme outer edge of the whole bone, being the larger. These two processes are received in the two notches of the articular edge of the squamosal. A fracture during development showed conditions suggesting the presence of a small foramen piercing the quadrate from back to front, just above the lower margin and between the two posterior processes.

A specimen described later in this paper shows that this quadrate is incomplete, a very thin inwardly directed process being lost, certainly before fossilization.

*Frontal* (fig. 1).—The frontals meet one another in a long median symphysis running forward from the pineal foramen.

Each frontal is united by suture with the postfrontal and sends back a narrow process between the thin film of parietal in advance of the pineal foramen and the middle line.

The frontal also articulates with the prefrontal and nasal and does not enter into the orbit. The under surface is not exposed.

*Postfrontal* (figs. 1, 2, & 5).—The postfrontal forms part of the postorbital bar, which is massive and has a flattened upper surface with a distinct groove leading inwards to the depressed area of the frontals. The lower face of the post-orbital bar is rounded.

The postfrontal sends a process backwards along the outer face of the parietal and ventrally bears a continuation of this process, which in effect continues the brain-case and no doubt gives protection to the olfactory nerves. The suture separating the postfrontal from the jugal cannot be seen.

*Prefrontal* (figs. 1 & 2).—The prefrontal is a large bone forming about one-quarter of the orbital margin; it unites by sutures with the postfrontal, frontal, nasal, and lachrymal. It has a powerful orbital plate, forming part of the front wall of the orbit and uniting with the corresponding plate of the lachrymal; this plate also reaches down to touch the upwardly directed process of the maxilla or palatine.

*Lachrymal* (fig. 2).—The lachrymal is a smaller bone than the prefrontal; it forms the front of the orbit and sends a long orbital ramus back over the dorsal surface of the palatal process of the jugal, so as to form a good deal of the floor of the orbit.

The lachrymal bears two small grooves leading over the rim of the orbit, which are separated by a low rounded process with a rough summit. Low down on the facial part of the bone is a lachrymal foramen of moderate size, and within the orbit in the orbital plate two more small foramina.

*Nasals* (fig. 1).—The remaining parts of the nasals show nothing of interest; they broaden posteriorly and unite with the frontals, prefrontals, lachrymals, and maxillæ.

There still remains to be considered a remarkable bone exposed only in transverse section on the broken end of the snout. As seen here it is a single median bone of oval section, narrow from side to side and standing close above the secondary plates of the maxilla, but not in contact with them.

I shall discuss this bone further in connection with other specimens.

### *Description of part of a Lower Jaw which probably belongs to the same individual as the Skull described above.*

R. 3588 is a fragment of the anterior part of the lower jaw of a *Diademodon* which is preserved in the same rather unusual matrix as the skull I have described above, and

agrees exactly with it in size and in the state of wear of the teeth; it seems certainly to belong to the same individual (fig. 2).

The jaw is remarkable for its thoroughly mammalian character. The two rami are indistinguishably fused at the symphysis, the upper surface of which is deeply grooved posteriorly.

The number of incisors is not definitely shown, but there appear to be three alveoli on each side. The only tooth preserved is the 3rd left incisor, which is rather broken; it appears to have a simple, conical, rather blunt crown.

The left canine is the better preserved; it is a powerful tooth of oval section, showing on the outer side in the lower unenamelled region a shallow groove. The anterior edge of the tooth bears a low faintly crenulated ridge, the posterior edge has a narrow worn face.

Behind the canine is a diastema of moderate length which shows nothing remarkable, there being no trace of any worn-down cheek-teeth such as Seeley described in "*Diastemodon*." On the left side 8 cheek-teeth are preserved, one being solely represented by its alveolus. On this side the teeth are very uniform in character, being all almost circular cylinders with horizontally worn tops. Their worn summits lie on a circle which is concave upwards.

On the right side the dentition is abnormal; the first tooth is low, its worn surface lying some 5 mm. below that of the second, the second and third are simple cylinders with a flat top, but the fourth has the posterior part of its crown worn down obliquely. The fifth is a knob with a rounded crown, and the sixth has a very deep groove on its anterior edge. The seventh has a flat, much-worn crown and is quite similar to the corresponding tooth of the opposite side.

The eighth tooth on the left side shows the very deep root closed below.

No trace of any bone except the dentary is to be seen in this fragment of jaw.

### *Description of some other Specimens which add to our knowledge of the Cynodont Skull.*

#### *Gomphognathus polyphagus*, Seeley.

Although Prof. Seeley's description of the type skull of *Gomphognathus polyphagus* is essentially complete and

accurate, examination of it in the light of the new skull which I have described above shows some new features :—

1. A septo-maxillary is plainly seen in the left nostril; it has been largely chiselled away on the right side. It forms a small part of the border of the back of the anterior nares, being wedged in between the premaxilla and the nasal. It has an anterior process which runs along on the premaxilla, forming a narrow floor to the nostril. The bone bears a small knob, which suggests a horizontal division of the nostril.

2. The transpalatine is very plainly seen, the sutures separating it from other bones, although close, being infiltrated with red. It occupies the same position as in the *Diademodon* skull and has the same relations, but has a rather larger palatal extension.

3. The left quadrate is well shown (fig. 8); it agrees closely with that described above, but has preserved a long, slender, inwardly directed process which is tightly applied to the inner and posterior face of the posterior ramus of the pterygoid. The relationship of this process to the pterygoid is the exact reverse of that which obtains in *Sphenodon* and other primitive Diapsids.

4. The side of the brain-case is fairly well shown and agrees exactly with that described above.

5. The continuity of the dorsal ridges of the vomer and anterior part of the basisphenoid, which was not quite established by the skull already described, seems to be demonstrated by this specimen.

### *Diademodon* sp.

R. 3605 is the imperfect anterior part of a *Diademodon* skull which was cut into slabs by Prof. Seeley.

It shows excellently the teeth and the relations of some of the bones of the palate.

In the region immediately behind the secondary palate the palatines are clearly seen as thin vertical plates tightly adpressed to the inner sides of the alveolar parts of the maxillæ. The vomer is displaced but still remains attached to the left palatine; it is high up in the skull, well above the level of the bottom of the narial passage. As it is traced forward it keeps this elevation until it finally disappears. In this region the secondary plates of the palatines come close together and meet. In this same region also begins a single median bone of oval section, much higher than wide. This bone can be traced forward, lying just dorsal to the

secondary plates of the palatines and maxillæ, with which it is not in contact, until on the anterior end of the specimen it is seen to have acquired a U-shaped section, being channelled on the upper surface.

This bone is very difficult of interpretation. It is a quite constant feature of all *Diademodon* skulls, in fact of the skull of all higher Cynodonts.

It appears to be pretty certainly the bone which in the type skull of *Gomphognathus polyphagus* projects between the palatal processes of the premaxillæ on to the palate.

Broom has suggested that this bone is here paired, a suggestion which receives some support from its appearance, but in the light of the other specimens described appears to be fallacious. If it is not paired it cannot be a prevomer as Broom has suggested. It is also certainly not the anterior end of the vomer, because in the specimen under consideration it is undisturbed, whilst the vomer is crushed out of place. It can apparently only be an ossification developed in the narial septum.

In these sections the teeth are beautifully shown : they are inserted in a completely mammalian fashion by deep V-shaped roots, inclosing a small pulp-cavity which is closed below. There appears to be absolutely no trace of successional teeth.

The teeth in the lower jaw are always narrower than those in the upper jaw. Anteriorly one of them is shown which, like the anterior teeth described by Dr. Broom in *Diademodon mastacus*, has a high, bluntly pointed, and enamelled crown.

### *Cynognathus* sp.

R. 2572 of the British Museum collection is the undistorted back of the skull of a *Cynognathus* which has already been described by Seeley. Seeley suggested that it might belong to *Cynognathus berryi* ; but there appears to be no reason why it should not really belong to *C. crateronotus*, all differences from the type skull of the latter being explicable as due to crushing.

The specimen is broken off anteriorly just behind the columellæ cranii, but shows very well all the bones of the brain-case behind that plane. The structure agrees exactly in general features with that which I have already described in *Diademodon*.

The basi-, ex-, and supraoccipitals are all fused and between them surround the small, almost circular, foramen magnum. A well-marked suture starts in the middle of the

inner edge of the post-temporal fossa, which is relatively bigger than in *Diademodon*, passes straight inwards, about halfway to the foramen magnum and then turns vertically: it rises well above the foramen magnum and is then lost. This suture separates the parietal from the exoccipital, supraoccipital, and interparietal.

The paroccipital processes are powerful and their anterior faces are weathered away so as to show the structure. Slight differences in this structure and on the left side an apparent suture suggest that each process is composed of two parts, an upper and smaller, which is probably the exoccipital, and a lower the opisthotic.

The bone forming the upper part of the post-temporal fossa is the parietal, and the suture which separates it from the pro-otic part of the periotic is plainly visible on both sides.

Along the suture runs a deep groove, and a broken area along the top of the pro-otic shows that this was formerly covered by a lamina, just as in *Diademodon*. In the suture is a small foramen opening outwards and backwards. The broken edge on the pro-otic is continued outwards and downwards so as to show that there was formerly a strong lamina covering the groove leading from the pterygo-paroccipital foramen to the post-temporal fossa.

The pro-otic bears a comparatively small process for articulation with the pterygoid.

The deep pit lying just external to and in front of the condyle is very large and well shown; it has apparently four foramina opening into it:—

1. A small foramen passing directly backwards just above the condyle.
2. A large foramen opening into the very bottom of the pit.
3. A small foramen opening forward.
4. A small foramen opening inwards.

Immediately to the outside and slightly in front of the pit is the fenestra vestibuli, an oval hole about five millimetres across. Except on the side towards the pit the fenestra is surrounded by a wide flat area.

Slightly in advance of the fenestra vestibuli lies the small oval foramen for the facial nerve; and from it a narrow groove, presumably a suture, passes upwards and forwards to cut the upper surface of the basisphenoid above the posterior rim of the pituitary fossa. This suture separates the pro-otic region of the periotic from the basisphenoid.

On the front end of the specimen the posterior face of the

pituitary fossa is well shown ; it has a vertical surface nearly a centimetre square ; and broken triangular areas show the former presence of posterior clinoid processes. The posterior wall of the fossa is not pierced by any openings, so that the carotids must have entered it by passing along the sides of the basisphenoid.

Below the fossa is a large broken area, whence the basisphenoid was once continued to form its floor.

Prof. Seeley correctly identified the pit as the foramen jugulare and the fenestra vestibuli of this specimen, but I cannot accept the rest of his description of the bones of the brain-case.

*Cynognathus crateronotus*, Seeley.

A re-examination of the skull of the type specimen shows that the whole structure agrees very closely in all essential details with that of the *Diademodon* skull. Many of the sutures of the brain-case are visible and give further support to those described in the latter genus. The system of grooves over the brain-case is exactly as in *Diademodon*, but the laminæ covering them have been largely destroyed during the development of the specimen.

In two particulars the skull adds to our present knowledge :—

1. There is a somewhat faint but quite definite jagged suture crossing the triangular area on the underside of the basisphenoid. This suture is quite unlike the straight suture which one expects between two cartilage bones, such as the basioccipital and the basisphenoid, and has much more resemblance to the overlap of a membrane bone on to a cartilage bone.

It is probable that it is really the back of the vomer, which would then have, as Broom has already pointed out, all the relations of a mammalian vomer or of a reptilian parasphenoid.

2. The process of the squamosal which lies on the front side of the occipital plate of the parietal is marked by muscular insertions and impressions, which do not point down into the temporal fossa, but backwards towards the corner of the V separating the median from the lateral regions of the occiput.

The significance of this curious feature will be discussed later.

"*Theromus.*"

The impression of the hinder part of a small skull which Seeley found at Klipfontein and described as *Theromus*? is

of such interest that, although almost certainly a Therocephalian and not a Cynodont, it is described here.

The evidence for its Therocephalian nature is of two kinds :—

1st. The locality is said by Broom to be in rocks of Permian age.

2nd. The size of the non-dentary elements of the lower jaw and many other details of its structure show that it is more primitive than any known Cynodont.

It is probably the most instructive Therocephalian skull known, although it is only represented by an impression in hard sandstone, and the structure is only intelligible in artificial impressions taken from it.

Prof. Seeley's description is quite accurate, but some further details may be made out.

The bones of the basis cranii are seen from above (fig. 9).

The occipital condyle is not well shown and its left side has been destroyed ; it seems, however, to have been at least incipiently double.

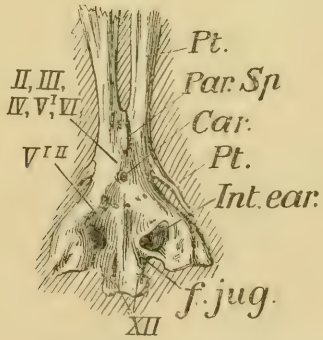



Fig. 9.—"*Theromus.*" Dorsal surface of the bones of the basis cranii and palate. *Car.*, foramen for internal carotid ; *Int.ear.*, opening to internal ear

Just in front of it is a small foramen, probably for the 12th nerve.

In front of this again is a much larger foramen leading outwards and backwards ; this is no doubt the foramen jugulare. Lying just in front of the foramen jugulare on on each side is the great opening leading into the inner ear.

This opening, which was of course closed by a membrane during life, is relatively larger than in any recent reptile except *Sphenodon*.

This appears to be a very primitive character.

In *Sphenodon* and in all ordinary reptiles with which I am acquainted the inner ear lies to the side of the brain-cavity and not at all below it. The opening into the inner ear, if one exists in the dried skull as in *Sphenodon* and *Chelonia*, forms a great hole in the side wall of the brain-case.

In the skull of *Theromus*, however, this opening faces downwards and is largely on the lower surface of the brain-case, so that the inner ear lies below the level of the bottom of the brain.

This remarkable character probably depends on that great reduction of the quadrate, and of all the bones which lie below the opisthotics, which occurs in and characterizes the Therapsids. What was the origin of this reduction we do not know, and in the present state of our knowledge of early Therapsids it is useless to speculate; but the change in the position of the ear was of great importance, for it rendered possible that gradual enlargement of the brain which is the dominating factor of the evolution of mammals. Only in this skull and in mammals is the inner ear known to lie below or level with the base of the brain.

In advance of the auditory region is a notch, the incisura pro-oticum, for the last branch of the trigeminus. Just in front of this notch lie two low processes, presumably processi anteriores inferiores pro-oticorum. Still further to the front lies the small deep pit which Seeley regarded as a carotid canal, a view which may very possibly be correct: it might, however, have lodged a small pituitary process.

Just in advance of this region the posterior rami of the pterygoids pass out from the sides of the basisphenoid towards the quadrates. They are not supported by a process from the periotic as they are in *Diademodon* and *Cynognathus*.

From their upper surfaces just after they leave the basisphenoid rise small processes, which are undoubtedly the bases of the columellæ cranii, here only very short anteroposteriorly. In front of them is a smooth wide groove, which probably marks the point of exit of the II., III., IV., V.[1], and VI. nerves.

The anterior end of the basisphenoid ends in a very sharp high ridge, which is most probably the beginning of a parasphenoidal rostrum.

As Seeley states, the quadrate appears to be recognizable on the right side; it is comparatively large, but not well enough shown to be describable.

The squamosals show the presence of a small post-temporal fossa, of a wide and shallow V-shaped notch separating the

median and lateral areas of the occiput, and are further remarkable for the possession of large backwardly directed plates similar to those of *Dicranozygoma leptoscelus*, although apparently much less developed.

The occurrence of a definite, long, narrow, interpterygoid vacuity was correctly described by Seeley.

The fragments of lower jaw preserved seem to show that the surangular was long and the coronoid process very low.

### *Some general considerations concerning the Structure of the Cynodont Skull.*

The identifications of the bones which I have described above depend on a comparison of the Cynodont skull with those of other early and primitive reptiles. All the determinations are of old standing, having mostly been made by Owen or Seeley.

I follow Broom's determination of the vomer as corresponding to that of a mammal and being probably a modification of the reptilian parasphenoid associated with the development of a secondary palate. It is worthy of note that in the crocodilian genus *Metriorhynchus* there is a median vomer (Leeds, 1908) which is probably also a parasphenoid.

The pterygoid is easily recognized, and comparison with other early reptiles with the primitive reptilian (Rhynchocephalian) palate shows that its remarkably slender posterior ramus and somewhat unusual articulation with the basisphenoid are to be correlated with the great reduction of the quadrate and of all the bones which lie below the base of the brain. *Theromus* provides an intermediate condition.

The transverse bone has its usual relations despite its considerable reduction.

The identification of the various foramina depends on a comparison with *Sphenodon* and a turtle, the broad columella cranii of the latter rendering it rather more similar to a Cynodont in the structure of the anterior part of the brain-case. Starting at the back we find that :—

I. Nerve XII. issued by the notch on the rim of the foramen magnum.

II. Nerves XI., X., IX. issued through the large pit which exactly corresponds in its general relations with the foramen jugulare of *Sphenodon*.

III. Nerve VII. issued through the small foramen lying just in advance of the fenestra vestibuli, which agrees exactly with the corresponding foramen in *Sphenodon*.

IV. Part of nerve V. must have issued through the foramen in advance of the pro-otic; whether this part included both the maxillary and mandibular branches or only the latter will never be known.

V. Finally, the conditions in *Sphenodon*, and still more in *Chelone*, show that all the other cranial nerves issued in advance of the columella cranii.

I have already pointed out the evidence that the internal carotid passed along the side of the basisphenoid covered without by the posterior ramus of the pterygoid, and finally entered the pituitary fossa through its widely open side.

No structures in *Sphenodon* or any other reptile give us any help in discovering the function of the elaborate series of canals on the walls of the brain-case which have been described in detail above *. They may, however, be directly compared with the series of venous canals which occur well developed in Marsupials and Insectivores.

The main canal, that which runs along the junction of the parietal and columella, occupies the same position as the "sinus canal" described by Parker in *Erinaceus*, which also occurs in many other Insectivores, including some Zalambdodonts.

Some of the other canals and foramina, including the post-temporal fossa, may be analogous or homologous with the many venous foramina which pierce the back of the zygomatic arch in Marsupials and Insectivores.

This old and distinguished history may be held to explain the very remarkable constancy of these, often very small, foramina.

Before discussing the ear it is advisable to discover the position of the digastric muscle. In reptiles this muscle, which is quite superficial in position, rises from the posterior surface of the post-temporal (squamoso-parietal) arch and passes downward, covering all the muscles of the neck, to be inserted into the post-articular part of the mandible. In the Cynodont mandible, as Seeley and Broom have

* I have recently discovered somewhat similar conditions in *Belodon*, *Erythrosuchus*, and *Mystriosaurus*.

described it, there is no post-articular projection, and the only possible insertion for the digastric is onto the small, almost vertically placed posterior face of the articular. This implies that the pull of the muscle must have been approximately horizontal. There is no evidence of any muscle insertion which would allow a direct pull in this direction, but any muscle passing from within the temporal fossa over the notch and down the groove which separates the median from the lateral regions of the occiput would be in exactly the right position.

A muscle in this position is attached at its upper end to the parieto-squamosal arch as the digastric should be, and its peculiar insertion on to the anterior instead of the posterior face of this arch is simply due to the great development of the muscles of the neck inserted into the median division of the occiput. This development of neck-muscles is associated with increase in size and of power of jaw in a carnivorous animal living on land.

It will be remembered that in the type skull of *Cynognathus crateronotus* the muscular insertions on that process of the squamosal which extends forwards on the front face of the parietal point downwards and backwards towards the groove. I take it that these are the insertions of the digastric; if they are not, I do not know what they can be.

The recognition of the fenestra vestibuli settles the position of the tympanic cavity. As in all reptiles with a primitive palate this lies outside the fenestra, and is surrounded above and behind by the paroccipital process and in front by the posterior ramus of the pterygoid.

The position of the membrana tympani is more difficult to settle, but it must lie in one of two regions.

In the majority of reptiles the tympanic membrane is placed almost vertically, attached to the posterior border of the quadrate, and such we should expect to be its position here. We find, however, that this position lies in the middle of the great smooth groove in the squamosal which leads round from the space between the end of the paroccipital process and the posterior ramus of the pterygoid to the upper and outer surfaces of the skull. The character of the surface of this groove, which in the *Diademodon* skull is perfectly preserved, shows that this position is an impossible one and that the membrane must have been at one end or the other of the groove.

In *Diademodon* the border of the outer end of the groove is continuous in front, and at first presents some resemblance

to the rim to which the membrane is attached in *Chelys*. As, however, it is continuous with a wide groove on the side of the zygomatic arch in *Cynognathus* and is of a curious shape, so that any membrane attached to it would be twisted in two directions and would not have a developable surface, it can scarcely be the actual point of attachment of the membrane, whose situation must be sought at the inner end of the groove.

Here there is a small roughened ridge lying just external to the paroccipital process, which could well have given it attachment.

The presence of a membrane in this position is consistent with the very small fenestra ovalis, which implies a small stapes.

If the positions of the digastric muscle and membrana tympani here adopted be correct, the smooth groove on the back of the zygoma can only be an external auditory meatus, a suggestion of its function which has already been tentatively made by Gregory.

It is now of importance to compare the ear we have thus arrived at with that of a mammal.

We have seen that the tympanic cavity of a Cynodont is bounded by the paroccipital process of the periotic above and behind, that in front it is covered by the posterior ramus of the pterygoid, and that the squamosal may probably enter very slightly into its roof externally.

The tympanic cavity in a marsupial is bounded by the periotic above, and behind by the glenoid ramus of the alisphenoid, which usually forms a bulla in front, and by the squamosal externally above.

It is seen that except for the replacement of the posterior ramus of the pterygoid by the glenoid part of the alisphenoid, these bones are the same, and this suggests a comparison of the pterygoid of Reptiles with the alisphenoid of Mammals.

The pterygoid in a Cynodont has the following relations:—

1. It articulates with the basisphenoid.

2. It has a large ascending process, forming part of the wall of the brain-cavity and articulating with the parietal. This separates the exits of the II., III., IV., V., and VI. nerves from those of the second and third branches of the V.

3. It has an anterior ramus articulating with the palatine, the ectopterygoid, which lies entirely ventral to it, and the jugal. Internally it is separated from its fellow by the vomer anteriorly and the basisphenoid posteriorly.

4. It has a posterior process passing backwards towards the point of articulation of the lower jaw, which articulates with a process of the periotic and forms the anterior wall of the tympanum.

5. Lastly, the caroticus internus enters the cranial cavity through a canal between the posterior ramus of the pterygoid and the basisphenoid.

The alisphenoid of *Dasyurus* has the following relations:—

1. It articulates with the basisphenoid.

2. It has a large ascending process which articulates with the parietal, separates the exits of the II., III., IV., V.[1], and VI. nerves from those of the second and third divisions of the V. (which, however, pass through it and not behind it).

3. It has an anterior part articulating with the palatine and the "pterygoid," which lies on its inner or ventral surface. Internally it is separated from its fellow by the vomer and the basisphenoid.

4. It has a posterior process running back towards the point of articulation of the lower jaw, which articulates with the periotic and forms the anterior wall of the tympanum.

5. Lastly, the caroticus internus enters the brain-cavity through a canal lying between the posterior process and the basisphenoid.

*Dasyurus* is not exceptional in these relations, which are found with only slight variations in all Marsupials, and from which those of higher Mammals only differ in the reduction of the posterior process of the alisphenoid, which is, however, found in a reduced form in many Insectivores.

The relations of the pterygoid of Cynodonts (which are essentially similar to those of the pterygoids of other primitive Reptiles) are so exactly similar to those of the alisphenoid of primitive Mammals, as described above, that the conclusion that the alisphenoid of Mammals represents the pterygoid of Cynodonts (and other Reptiles) is to me irresistible.

This conclusion is, I believe, new; but Parker and Cope have held that the epipterygoid of Reptiles was the alisphenoid of Mammals.

So far as I know, the only evidence against the view that I have just urged is that the pterygoid of Reptiles is a membrane bone, whereas the mammalian alisphenoid is a cartilage bone. This difficulty does not seem to me a very serious one: the tendency nowadays is to lay less and less stress on this difference, and in any case the whole pterygoid

and epipterygoid of Reptiles are formed in connection with a cartilaginous "Anlage."

If this view be accepted, it follows that the mammalian pterygoid is not homologous with the reptilian pterygoid, but with the reptilian transverse bone, a view already held by Seeley.

It remains to discuss the remarkable bone developed in Cynodonts and other Therapsids in connection with the tympanum, which has been called by Seeley a stapes, a rudimentary cochlea, and a tympanic, and by Broom consistently a tympanic.

This bone is not present in its natural position in any of the skulls of higher Cynodonts which I have been able to examine; it is, however, preserved in position in the type skull of *Thrinaxodon liorhinus*, Seeley, and displaced in one of Seeley's *Gomphognathus* skulls. It has also been figured in *Cynognathus platyceps* by Broom.

In *Gomphognathus* it is a narrow, straight, thin bone forming part of a cylinder, and, according to the evidence of the other specimens, articulating at the inner end with the periotic (or basisphenoid?) just below the fenestra vestibuli, and at its outer end with the quadrate.

I can see no evidence that it took any part in the support of the membrana tympani, for had it done so the membrane would have been twisted, part being horizontal and part vertical, a position in itself improbable and not supported by the appearances of the rest of the region. There can be little doubt that the function of this bone is to protect the tympanic cavity from pressure from beneath, a necessity in an animal with a very wide gullet in which the cavity was exposed to the pressure of food.

I know of nothing in Reptiles except the immediate relations of Cynodonts which can be compared to this bone; but it is instructive to compare it with the tympanic and entotympanic of Mammals.

In all the more primitive Mammals with which we are acquainted the function of the tympanic is the support of the membrana tympani. It never takes any part in the strengthening of the floor of the tympanum. When increase in size and other alterations rendered the provision of a bulla necessary, it was provided by three distinct bones—in Marsupials by the alisphenoid, in the Tupaiids by the entotympanic, and in the majority of higher Mammals by the tympanic.

This seems to me good evidence that the tympanic is not derived from a bone whose main if not its only function is the protection of the under surface of the ear.

I am therefore unable to accept the identification of the problematical bone in Cynodonts called by Broom tympanic with the bone of the same name in Mammals. If a mammalian homologue must be found for it, the entotympanic, which stretches from the tympanic to the basisphenoid in *Tupaia*, seems the most suitable; but as this bone does not seem to be of wide distribution in the Mammalia, it is probably a neomorph.

The resemblances of the Cynodonts, and, indeed, of Therapsids generally, to Mammals have been commented on by all authors from the time of Owen's original description till to-day, and almost all recent descriptions of their remains have been written from the mammalian standpoint. The preceding description is one of the few exceptions, and it was not until I had spent many days in fruitlessly trying to identify the various foramina by comparison with marsupial and insectivore skulls that I commenced a comparison with other reptiles.

The resemblances of Therapsids to Mammals are:—

1. The presence of a single zygomatic arch formed by the squamosal and jugal. (Owen, Seeley, Broom.)
2. The division of the teeth into incisors, canines, and cheek-teeth. (Owen, Seeley, Broom.)
3. The mode of insertion of the teeth. (Owen, Seeley.)
4. The presence of a secondary palate in Cynodonts. (Seeley, Broom.)
5. The presence of a median vomer (developed from the parasphenoid?). (Broom.)
6. The great reduction of the quadrate and the bones of the lower jaw except the dentary. (Seeley, Broom.)
7. The presence of a long distinct external auditory meatus. (Gregory.)
8. The double occipital condyle of Cynodonts. (Seeley.)
9. The general resemblances in the vertebral column. (Seeley.)
10. The very mammalian form of the scapula and pectoral girdle. (Seeley, Broom.)
11. The build of the humerus. (Owen, Seeley, Broom.)
12. The presence of an olecranon process. (Seeley).
13. The structure of the carpus. (Seeley, Bardeleben, Broom.)

14. The reduced number of phalanges in the hand and foot: 2.3.3.3.3. (Broom.)
15. The presence of a sacrum of more than two vertebræ. (Owen, Seeley.)
16. The structure of the pelvis. (Owen, Seeley, Broom.)
17. The structure of the tarsus. (Broom.)

To these I now add :—

18. The small fenestra vestibuli.
19. The ventral position of the inner ear seen in *Theromus*.
20. The presence of an extensive series of canals on the side of the brain-case, only comparable with those which lodge a venous system in Insectivores.

This extraordinary series of resemblances, many of them of a particularly deep-seated character, can only mean that the Therapsids are to be associated with the ancestry of the Mammals. It is none the less improbable that the Cynodonts themselves are closely connected with the ancestral mammal. They appear to be an examp'e of a group which, whilst retaining a very primitive structure in some of the more deep-seated regions, such as the brain-case and brain, have developed specializations which are prophetic of the developments which will be much more slowly but securely carried out by the descendants of a more conservative line of the same stock.

It is impossible with our present very slight knowledge of Therapsids to decide which of the many resemblances to Mammals catalogued above have descended to the Cynodonts and Mammals from a common ancestor, and which are due to that similarity in the course of evolution in two allied stocks which is now being gradually realized as a most important factor to be considered in the study of phylogeny and the laws of evolution.

*The Homologies of the Zygomatic Arch of the Therapsids.*

The zygoma of Cynodonts and Therocephalians is formed by the squamosal, postorbital, and jugal. As it contains a squamoso-postorbital part, at any rate in the more primitive types, it seems natural to regard it as representing the two arches of Diapsids fused, the quadrato-jugal being lost.

Dr. Broom has, however, made the remarkable suggestion that it really corresponds to the lower arch, the single temporal fossa answering to the lower fossa of *Sphenodon*, and implying that the upper arch has fused on to the side of

the brain-case, being represented by the process which I have described above in *Diademodon*.

The evidence on which he seems to rely is that in Dicynodonts, Deinocephalians, and Dromasauria the side of the brain-case is overlapped by processes of the squamosals and postorbitals or postfrontals, which meet and exclude the parietal from the temporal fossa. In Dicynodonts and some Deinocephalians I have been able to see this arrangement, but even in these cases there is still a squamoso-postorbital arcade. It appears to me simpler to regard the condition in Dicynodonts, &c., as secondarily arrived at from one resembling that in Cynodonts.

The occurrence in the type skull of *Cynognathus crateronotus* of a small infra-temporal fossa lying between the jugal and the squamosal appears to be conclusive evidence that the temporal fossa of Therapsids does not represent the infra-temporal fossa of Diapsids.

This small infra-temporal fossa in *Cynognathus* was correctly interpreted by Seeley.

*Systematic Revision of the Gomphognathid Genera* Diademodon, Gomphognathus, *and* Diastemodon.

In 1894 Seeley founded the genus *Diademodon* for some fragments of jaws from the Karroo which showed molar teeth with wide flat crowns ornamented with cusps and ridges. The type species is *Diademodon tetragonus*, founded on a small piece of snout, and to the genus were referred *D. brachytiara*, the type specimens being isolated teeth; *D. mastacus*, founded on a piece of maxilla with three perfect teeth; and *D. browni*, founded on the middle portion of a skull with one perfect tooth.

In 1895 Seeley founded another genus, *Gomphognathus*, distinguished from *Diademodon* by the cheek-teeth being worn down flat.

The type species, *G. kannemeyeri*, was founded on a mandible showing the teeth, to which was attached the back of a skull and some cervical vertebræ. To this genus Seeley referred an excellent skull lacking the lower jaw, which is the type of *G. polyphagus*, and another excellent skull with the mandible closed on the palate, which he referred to the same species.

More recently Seeley described a new species, *Diademodon entomophonus*, the type being the middle portion of a skull with some teeth.

Finally, in October 1908, Seeley described a new subgenus

and species of *Gomphognathus, Diastemodon dimorphodon,* on the anterior part of the right ramus of the mandible. This subgenus was defined as having a very long diastema in the lower jaw, the hinder part of which bears the roots and worn-down crowns of "premolars."

The systematic study of the group is hindered by the very great difficulty of distinguishing the signs of wear on the teeth and the apparent changes in the character of the teeth with age.

No characters exist for separating *Diademodon* and *Gomphognathus,* except the fact that the teeth in the type of *Diademodon* are little, if at all, worn, whereas the teeth of the type of *Gomphognathus* are worn flat. This difference is merely due to age.

The difference between *Gomphognathus* and *Diastemodon* pointed out by Seeley is a genuine one, and when our knowledge becomes more adequate the latter will probably have to stand. At present, however, as the lower jaw R. 3588 is intermediate between *Gomphognathus kannemeyeri* and *Diastemodon dimorphodon* in this character, I think it most convenient to include the whole series of species in the one genus *Diademodon.*

*Diademodon tetragonus,* the type of the genus, and *D. brachytiara* are so badly known as to be at present unrecognizable.

The most primitive of the remaining types of which the maxillary dentition is known is *D. browni,* to which species I refer the skull that has been described at length above.

The reasons for this reference are:—

1. Agreement in size.

2. Agreement in the structure of the upper and lateral surfaces so far as they can be made out in the type.

3. The fact that the posterior borders of the secondary plates of the palatines meet in an angle and not in a straight line.

4. Agreement in the relative sizes of the dental alveoli, in the structure of the fourth molar from the back when allowance is made for wear, and of the extreme tips of the last molar.

The dentition has been described above, and its important systematic features are:—

1st. The very small size of the inner lobe of the penultimate molar.

2nd. The fact that the third molar from the back is only $\frac{7}{9}$ of the width of the one in front.

*D. entomophonus* is distinguished from *D. browni* by :—
1st. The rather larger inner lobe of the penultimate molar.
2nd. The third molar is nearly as wide as the fourth, being $\frac{17}{18}$ of it.

*D. mastacus* is easily distinguished :—
1st. By the very large size of the inner lobe of the penultimate tooth.
2nd. The third tooth is $\frac{17}{20}$ of the width of the fourth, but is very long antero-posteriorly.

*D. polyphagus* most unfortunately does not show the characters of the last three molar teeth. It is distinguished from all the species recorded above by the fact that the fourth tooth from the back is extremely short, much shorter than the fifth.
In this species the posterior borders of the secondary plates of the palatines meet in an almost straight line, a condition markedly different from that in *D. browni*. (This difference is exactly parallel to that which separates the crocodilian genus *Steneosaurus* from the more primitive *Mystriosaurus*.)

The other skull figured by Seeley as *Gomphognathus polyphagus* has the lower jaw closed on the palate, so that the characters of the dentition are not visible. The last molar as seen in side view has the same backwardly curved crown of the last upper molar as *Diademodon browni*. This skull in the character of the back of the palatines agrees with *D. polyphagus*. It differs from the type of this species, however, in being proportionately broader over the squamosals and in the much greater distance between the foramina jugulares.
It will probably be best for the present to leave it without specific determination.
*D. kannemeyeri*, the type of *Gomphognathus*, differs from *D. browni* and *D.* sp. in the much shorter diastema in the mandible. As the upper teeth are unknown it cannot be further defined.
*D. dimorphodon* differs from all the above species in which the lower jaw is known, in the fact that the hinder part of the long diastema shows the roots and worn-down crown of anterior cheek-teeth.

In conclusion, I wish to express my great indebtedness to Drs. A. S. Woodward and C. W. Andrews, of the British

Museum, for the liberality with which they have allowed me to describe the skull of *Diademodon browni* and to revise the whole of the unique series of Cynodont remains under their charge.

To these gentlemen and to Baron Franz Nopcsa I am indebted for much kind advice and criticism.

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## XLI.—*New Species of* Urocyclidæ *from British East Africa.* By Dr. C. Pollonera.

[Plate VIII.]

### *Urocyclus* (*Microcyclus*) *signatus*, sp. n. (Pl. VIII. figs. 1, 2.)

*U.* pallide ochraceo-aurantiacus, antice pallidior, castaneo-nigrescenti zonatus. Clypeus granulosus, postice rotundatus; foramine palliali amplo; apertura pulmonea leviter post-mediana, pallide marginata; colore ochraceo-aurantiacus, medio leviter fuscatus et brunneo maculatus, lateraliter bizonatus, zona principalis obscuriore. Dorsum obtuse carinatum, carina ad clypeum fere evanescente, utrinque obscurissime unizonatum et superne lineis plurimis interruptis notatum. Solea pallida, medio pallidiore.

Longit. dorsi mill. $12\frac{1}{2}$; clypei $9\frac{1}{2}$; soleæ 26.

*Hab.* Mt. Kenia, at an altitude of 9000–10,000 feet (*Robin Kemp*).

Although both the specimens of this species which I have been able to examine were not quite adult, the reproductive organs, though still very small, were sufficiently developed to give an idea of their structure.

I place this species in the subgenus *Microcyclus* on account of the prostate gland not being of an elongate shape as in typical *Urocyclus* and in the subgenus *Mesocyclus*; at the same time this organ is much smaller than is the case with the other species of *Microcyclus* hitherto described. These intermediate characters, which further lessen the differences between the subgenera *Mesocyclus* and *Microcyclus*, have decided me in regarding the latter group as a subgenus of *Urocyclus*; moreover, Dr. Simroth *, when creating the genus *Microcyclus*, stated that it might also be considered a subgenus of *Urocyclus*. Dr. Kobelt † is mistaken in attributing to me the creation of the genus *Microcyclus*, which he holds to be a distinct genus, while regarding *Trichotoxon* as a simple subgenus of *Urocyclus*. I do not think that this opinion is tenable, as *Microcyclus* and *Urocyclus* are separated by very slight differences, while *Trichotoxon* differs by the absence of the prostate gland and by the proportionately enormous *atrium* containing several darts.

* 'Ueber bekannte und neue Urocycliden,' 1896, p. 303.

† 'Die Mollusken ausbeute d. Erlang. Reise in Nordost-Afrika,' 1909, p. 60.

The three new species of *Trichotoxon* about to be described should, in my opinion, constitute a new subgenus, for which I propose the name DENDROTOXON.

This subgenus differs from typical *Trichotoxon* in possessing (as is also the case in *Dendrolimax*) on the upper extremity of the *epiphallum* a true, though very small, *flagellum* instead of the calcareous gland.

Dr. Simroth employs the term "*kalk-sac*" for both the true flagellum, situated on the lower side of the epiphallum, and also for the calcareous gland on the upper side; personally I prefer to give different names to these two characters, especially as in some species of the *Urocyclidæ* there is an absence of the calcareous gland inside the flagellum.

*Trichotoxon* (*Dendrotoxon*) *kempi*, sp. n.
(Pl. VIII. figs. 5, 6, 7.)

Clypeus postice rotundatus, profunde sulcatus et valide rugosus; brunneo-fuscus, summitate rugarum sordide albidus; apertura pulmonea distincte antemediana; apertura pallialis angusta sed distincta. Dorsum valide sed obtuse carinatum, granulosum, lateraliter oblique sulcatum; colore terreo, maculis rotundatis, amplis, evanescentibus, grisco-nigrescenti conspersum et minutissime albido punctatum. Pedis margo externus transverse sulcatus et minutissime albido-punctatus. Solea lævis, unicolor, zonæ laterales leviter transverse sulcatæ.

Longit. dorsi mill. 35; clypei 22; soleæ 62.

*Hab.* Between the Igembi Hills and Nyeri (*Robin Kemp*).

The light blotches on the shield, the small scattered spots upon the back, the carina, and the margin of the foot are produced by a calcareous concretion identical with that producing the large light blotches on *Dendrolimax*.

The reproductive organ (fig. 6) shows an atrium terminating above in two rounded points and enclosing four extraordinarily long, pitted, pointed, and slightly recurved darts (fig. 7). The lower flagellum is very long; the upper very small, preventing a view of the calcareous gland, which perhaps is either altogether absent or is very much reduced in size.

*Trichotoxon* (*Dendrotoxon*) *prestoni*, sp. n.
(Pl. VIII. figs. 8, 9, 10, & 11.)

*T.* sat robustum, coriaceo unicolor, antice tantum pallidior. Clypeus postice rotundatus, longitudinaliter valide rugosus, apertura palliali angustissima, apertura pulmonea vix antemediana.

Dorsum rugosum, lateraliter sulcis parum profundis sulcatum, per totum longitudinem carinatum ; carina valida, obtusa, postice tortuosa. Solea unicolor, zona mediana granulosa, laterales transverse sulcatæ.

Longit. dorsi mill. 34 ; clypei 26 ; soleæ 72.

*Hab.* Between the Igembi Hills and Nyeri (*Robin Kemp*).

Differing from the preceding species in its larger size, twisted carina, less forwardly placed pulmonary orifice, and by the total absence of all spots, either light or dark.

The reproductive organ (fig. 8) differs from that of *T. kempi* in the shape of the atrium, which terminates above in two more lengthened, divergent, and less rounded points. The neck of the bursa copulatrix is less long, more pitted, and terminated by a cylindrical arch which is wanting in *T. kempi*. The penis is less twisted and of a different shape. The lower flagellum (fig. 11) is shorter, less pitted, and greatly swollen by the rounded eminences of a tissue which is more transparent than that of the flagellum ; it ends on its free side in a small oval sac of the same nature as the lateral eminences. The upper flagellum (fig. 10) is very small and permits a view of the white calcareous gland, which is situated on the interior of its base ; in the atrium I found five darts, much shorter and broader than those of *T. kempi* (fig. 9), and I believe this to be the first case, up to the present time, in which an uneven number of darts has been noticed.

### *Trichotoxon* (*Dendrotoxon*) *keniensis*, sp. n.
(Pl. VIII. figs. 3, 4.)

*T.* sat parvulum, ochraceo-aurantiaco unicolor, antice pallide ochraceum. Clypeus postice rotundatus, granulosus ; apertura palliali angusta ; apertura pulmonea distincte postmediana. Dorsum obtuse carinatum, rugoso-granulosum ; lateraliter sulcis obliquis, parum profundis, sulcatum. Solea, medio pallida, zonis lateralibus pallide brunneis, transverse sulcatis.

Long. dorsi mill. 17 ; clypei 13 ; soleæ 50.

*Hab.* Mt. Kenia, at an altitude of 9000–10,000 feet (*Robin Kemp*).

Differing from the two preceding species in its smaller size, in its granular and not longitudinally furrowed shield, on the posterior half of which is situated the pulmonary orifice, in the colour of the shield and dorsal surface, which is of a pale orange-ochre, disappearing on the posterior portion of the animal, and in the brownish colour of the lateral zones on the side.

The reproductive organ (fig. 3) is also very different from those of *T. kempi* and *T. prestoni*: the smaller and much more elongate atrium is truncate at the upper extremity, the penis is much longer and more pitted, and the lower flagellum is much shorter, the bursa copulatrix is ovoid. I found four darts, relatively rather large, more recurved, and of a somewhat club-shaped form.

EXPLANATION OF PLATE VIII.

*at.*=atrium; *p.*=penis; *ep.*=epiphallum; *fl.i.*=inferior flagellum; *fl.s.*=superior flagellum; *gl.c.*=calcareous gland; *c.d.*=vas deferens; *b.c.*=bursa copulatrix; *v.*=vagina.
The fractions show the enlargements of the drawings.

*Figs.* 1, 2. *Urocyclus signatus.*
*Figs.* 3, 4. *Trichotoxon keniensis.*
*Figs.* 5, 6, 7. *Trichotoxon kempi.*
*Figs.* 8, 9, 10, 11. *Trichotoxon prestoni.*

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## XLII.—*On* Arvicanthis abyssinicus *and allied East-African Species, with Descriptions of Four new Forms.* By Guy Dollman.

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The following paper is an attempt to arrange in systematic order the various species and subspecies of East-African field-rats belonging to the *Arvicanthis abyssinicus* group. On account of the great variation in colour and size met with in individuals of the same species, the subject presents so many difficulties that this paper cannot be looked upon as more than a temporary scheme for the arrangement and classification of the several forms. The key appended below is largely founded on skin characters and general dimensions, as these appear the most satisfactory. Altogether some four hundred specimens have been examined, and as far as possible average dimensions for each species and subspecies are given.

### *Key to the Species and Subspecies.*

A. Tail approximately equal to or rather longer than length of head and body.
  *a.* Light underparts not sharply marked off from flanks.
    $a^1$. Size of body large, about 150 mm. in length. General colour pale sandy ochraceous mixed with black. (Egyptian Soudan.) ..... (1) *testicularis*, Sund.

$b^1$. Size of body rather smaller; length of head and body about 140 mm. General colour darker, yellowish olive mixed with black and ochraceous. (Lado.) ..... (2) *t. jebelæ*, Hell.

*b*. Light underparts sharply marked off from flanks. (W. Bahr-el-Ghazal.) (3) *t. centralis*, subsp. n.

B. Tail shorter than length of head and body.

*a*. Size of body large; length of head and body about 174 mm.; average length of hind foot 35 mm. (Egypt.) .... (5) *niloticus*, Desm.

*b*. Size of body medium; length of head and body less than 170 mm., but more than 135 mm.

$a^1$. Tail longer (143 mm. in length). (Kaka, Soudan.) ..... (4) *luctuosus*, sp. n.

$b^1$. Tail shorter, not exceeding 125 mm. in length.

$a^2$. Dorsal stripe present.

$a^3$. Dorsal stripe well marked. Light patches behind ears well-defined. Length of hind foot 27 or 28 mm.

$a^4$. General colour greyish olive. Backs of feet and toes greyish buff. (S. Abyssinia.) (6) *abyssinicus*, Rüpp.

$b^4$. General colour dark blackish brown speckled with greyish buff. Backs of feet dark brown; toes black. (Guma, S. Abyssinia.) ..... (7) *a. saturatus*, subsp. n.

$b^3$. Dorsal stripe very indistinct. General colour ochraceous olive. No light patches behind ears. Average length of hind foot 30 mm. (Uganda.) (8) *a. rubescens*, Wrought.

$b^2$. Dorsal stripe absent.

$a^3$. Size larger; average length of hind foot 29 mm.

$a^4$. Ventral surface greyish, not differentiated from the brownish flanks. No light buff-coloured stripe down middle of belly. (Mumias and Elgon.) ..... (9) *a. nubilans*, Wrought.

$b^4$. Ventral surface greyish, washed with buffy white; line of demarcation between whitish belly and dark flanks. Pale buff-coloured stripe down middle of belly. (Guma, S. Abyssinia.) .... (13) *zaphiri*, sp. n.

$b^3$. Size smaller; average length of hind foot less than 28 mm.

$a^4$. Backs of hands and feet grey. Ventral surface grey, washed

with white. No ochraceous or buff-coloured suffusion. (Nairobi.) ..... (10) *a. nairobæ*, Allen.

$b^4$. Backs of hands and feet orange-buff. Ventral surface grey, washed with buffy white. General colour of back yellowish olive, mixed with black and ochraceous. (Naivasha.) ..... (11) *a. præceps*, Wrought.

$c^4$. Backs of hands and feet brownish, mixed with buff. Ventral surface greyish white, tinted with pale buff. General colour of back dark ochraceous. (Irangi, German E. Africa.) ..... (12) *a. neumanni*, Matsch.

*c*. Size of body small; length of head and body less than 135 mm.

$a^1$. Size larger; length of head and body more than 125 mm.

$a^2$. General colour greyish olive, faintly tinged with pale buff. Backs of hands and feet grey. Ventral surface greyish white. (Rumruti, Laikipia Plateau.) .. (14) *rumruti*, Dollm.

$b^2$. General colour sandy ochraceous, strongly tinged with buff. Backs of hands and feet white, tinted with buff. Belly buffy white.

$a^3$. Tail longer, 122 mm. in length. Skull larger, greatest length 34 mm. (Chanler Falls, Eusso Nyiro.) ..... (17) *chanleri*, Dollm.

$b^3$. Tail shorter, averaging 99 mm. in length. Skull smaller, greatest length 30 mm. (Somaliland.) ..... (15) *somalicus*, Thos.

$b^1$. Size smaller; length of head and body less than 125 mm. (Eusso Nyiro, E. Africa.)..... (16) *reptans*, Dollm.

## (1) *Arvicanthis testicularis*, Sund.

*Isomys testicularis*, Sundevall, Vet.-Akad. Handl. p. 221 (1843).

Size comparatively large, tail very long. General colour of dorsal surface pale sandy ochraceous lined with black. Dorsal stripe narrow and ill-defined, in some cases entirely absent. In bleached individuals the ochraceous colouring is much more evident, especially on the hind-quarters and posterior part of back. Flanks rather lighter than back and more buffy. Nasal region orange-buff, the buff colour in some cases extending back on to the face. Ears clothed with

short orange-buff hairs, the general effect more orange-coloured than in any of the allied species, in this respect resembling the *somalicus* group. Backs of hands and feet light buff-coloured. Under surface of body whitish; hairs with grey bases and white tips, the tips in many individuals tinged with buff. Ventral surface not sharply marked off from the flanks, the two areas gradually passing into each other. Hairs on throat, chin, and underside of limbs white. Tail with well-marked dark dorsal area, orange sides, and light buff-coloured under surface.

Skull large, in old individuals nearly equalling that of *niloticus*. Zygomatic region rather narrow, not markedly broader in the squamosal portion. Brain-case a good deal narrower than in *niloticus*, especially in the occipital region. Incisors and molars rather smaller than in the Egyptian species.

Dimensions in millimetres (measured in the flesh) :—

| | Average of 10 adults. | Max. | Min. |
|---|---|---|---|
| Head and body ..... | 151 | 160 | 146 |
| Tail ..... | 152 | 170 | 145 |
| Hind foot ..... | 31 | 34 | 29 |

Dimensions of adult skull :—

Greatest length 38·2 mm. ; basilar length 32 ; condylo-incisive length 36 ; zygomatic breadth 18 ; interorbital constriction 5·6 ; squamosal breadth of cranium 14·5 ; length of nasals 14 ; palatilar length 17 ; length of palatal foramina 8 ; length of upper molar series 7·3.

*Type locality.* Bahr-el-Abiad, Egyptian Soudan.

This species would appear to be one that enjoys a fairly wide distribution, ranging from Upper Egypt southwards towards the Bahr-el-Ghazal and eastwards as far as Arabia, the specimens from Aden being in every respect identical with those from the Nile Valley. In the Museum collections are specimens from the following localities :—Sennaar, Khartoum, Nakheila, Sherik, Shendi, Gerazi (Soudan), El Kama (Soudan), and Aden. The Sennaar specimens are practically topotypes, Bahr-el-Abiad, the type locality, being situated on the south-west side of Sennaar.

*Isomys variegatus*, var. *minor*, described by Sundevall *, is probably more nearly related to *testicularis* than to *niloticus*. The description would appear to agree better with the general colour scheme met with in the Southern species; but until topotypical specimens are available for examination it is

* Vet.-Ak. Handl. p. 221 (1843).

impossible to decide the affinities of this form. The type locality, Syrkut, Upper Nubia, is so situated that *minor* might represent a geographical race of either *testicularis* or *niloticus*.

(2) *Arvicanthis testicularis jebelæ*, Hell.

*Arvicanthis jebelæ*, Heller, Smith, Miscell. Coll. vol. lvi. (17) p. 9 (1911).

A form closely related to *testicularis*, differing only in its rather smaller size and more olive coloration.

The general colour of the dorsal surface rather less sandy than in *testicularis*; the colour scheme more like that of the true *abyssinicus*, but retaining the ochraceous colouring of *testicularis*. Nasal region not so buffy, the hairs rather darker and browner. Ears rather darker in colour. Under surface, feet, and tail as in *testicularis*.

Skull smaller than that of *testicularis*, with much shorter palatal foramina. Molar teeth markedly smaller.

Dimensions of type (measured in the flesh) :—

Head and body 140 mm.; tail 150; hind foot 29.

Skull: greatest length 35·5; condylo-incisive length 31·5; zygomatic breadth 17; interorbital constriction 5; length of palatal foramina 5·5; length of upper tooth-row 6·5.

*Type locality*. Lado Enclave.

In the British Museum are three specimens from the Kit River, Bahr-el-Gebel, which appear to represent this Lado form of *testicularis*, and it is evident from examination of these specimens and the original description that the Lado *Arvicanthis* must be regarded as a geographical race of *testicularis*, and not, as suggested by Heller, as a distinct species allied to *A. abyssinicus rubescens*, Wrought. The exceptional length of tail, ochraceous colouring, and white underparts are all characters diagnostic of *testicularis*.

(3) *Arvicanthis testicularis centralis*, subsp. n.

Allied to *Arvicanthis testicularis*, Sund., ochraceous brown in colour, without dorsal stripe, and having the white underparts sharply marked off from the buff-coloured flanks.

In size and general proportions rather less than in *testicularis*; tail rather shorter, about equal to length of body. General colour richer and darker; dorsal surface ochraceous buff lined with black. Hind-quarters and rump tinged with reddish. No trace of dark dorsal stripe. Flanks paler and purer in colour than back, the general effect rather yellower, owing to the dark ground-colour being less in evidence.

Face and head similar in colour to back. Nose and ocular rings yellowish buff, the nasal region speckled with black. Backs of hands and feet buffy white. Under surface of body white; hairs of belly greyish at base, with long white tips. White ventral surface sharply marked off from the buff-coloured flanks, the contrast more marked than in any member of this group. Tail much as in *testicularis*, but shorter and rather less hairy; above rather darker, more as in the *abyssinicus* group.

Skull a trifle shorter than in *testicularis*. Zygomatic region narrow anteriorly, expanded in the squamosal part, thus differing from the typical species, where the zygomatic arches are almost parallel.

Dimensions of the type (measured in the flesh) :—

Head and body 145 mm.; tail 143; hind foot 30; ear 19.

Skull: greatest length 36·5 mm.; basilar length 30; condylo-incisive length 34·5; zygomatic breadth 18·4; interorbital constriction 5; squamosal breadth of cranium 14·2; length of nasals 14; palatilar length 16·5; length of palatal foramina 6·9; alveolar length of upper molar series 7.

*Hab.* Between Chak Chak and Dem Zubeir, West Bahr-el-Ghazal.

*Type.* Adult male. B.M. no. 8. 4. 2. 45. Original number 38. Collected on September 3rd, 1907, by A. L. Butler, Esq.

The most characteristic feature about this western race of *testicularis* is the sharp contrast between the white ventral surface and ochraceous-buff colouring of the flanks; in the Sennaar species and *t. jebelæ*, recently described by Heller from Lado, the light ventral surface is not sharply marked off from the dark colour of the flanks, but gradually merges into it. In addition, this new race differs from the other two forms in having no trace of the dark dorsal stripe; the darker and more ochraceous colouring of the entire dorsal surface is a further point wherein this western form differs from the typical species. The Museum collection contains four specimens referable to this subspecies—three from the type locality and one from Tamburas, Bahr-el-Ghazal.

### (4) *Arvicanthis luctuosus*, sp. n.

A large dark-coloured species, probably allied to *testicularis*.

Size of body large; tail shorter than length of body, hind foot large. General colour of back dark blackish brown, coarsely speckled with light buffy grey, the effect almost as in *niloticus*, but light speckling not quite so prominent.

Face and head quite as dark as back ; ocular rings and tip of nose orange. Dorsal stripe practically absent, a faint suggestion of a median line visible under certain conditions of illumination. Flanks paler and greyer than back, the pale greyish buff-colour gradually merging into the light under surface. Backs of hands and feet brownish, washed with buff. Ventral surface of body light greyish white, faintly tinted with buff, the coloration irregular, as in *niloticus*. Hairs of belly with slate-grey bases and light tips. Tail short and well covered with hairs; dark blackish brown above, dirty buff-coloured below.

Skull like that of *testicularis centralis* ; supraorbital ridges more developed and with longer palatal foramina.

Dimensions of the type (measured in the flesh) :—

Head and body 155 mm. ; tail 143 ; hind foot 33 ; ear 17.

Skull : greatest length 35·4 ; basilar length 29·2 ; condylo-incisive length 33·9 ; zygomatic breadth 17·2 ; interorbital constriction 5 ; squamosal breadth of brain-case 14 ; length of nasals 13·2 ; palatilar length 15·8 ; length of palatal foramina 8 ; alveolar length of upper molar series 7·2.

*Hab.* Kaka, north of Fashoda, Soudan.

*Type.* Adult male. B.M. no. 1. 8. 8. 50. Original number 35. Collected on April 23rd, 1901, and presented to the British Museum by R. M. Hawker, Esq.

This species is represented in the Museum collection by three specimens—two from Kaka and one from Fashoda ; they all present the same exceedingly dark-coloured pelage, and are quite unlike any of the *testicularis* group. In general characters this form appears to be intermediate between *niloticus* and *testicularis*, possessing the short tail and general colouring of *niloticus* and with cranial characters more like those of *testicularis*. It is at present impossible to decide the exact relationship of this new species to the other forms of *Arvicanthis* inhabiting the Nile Valley ; probably it is more nearly allied to *testicularis* than to the Egyptian species. In general colour *luctuosus* is not unlike some of the northern races of *abyssinicus*, such as *rubescens* ; but on account of the great differences in the general dimensions and cranial measurements it cannot be considered as belonging to the *abyssinicus* group.

### (5) *Arvicanthis niloticus*, Desm.

1803. *Lemmus niloticus*, E. Geoff. Cat. Mus. Paris (nom. nud.).
1822. *Arvicola niloticus*, Desmarest, Ency. Méthod., Mamm. Suppl. p. 281.
1823. *Hypudæus varieyatus*, Licht. Verz. Doubl. Berlin, p. 2.

1827. *Hypudæus niloticus*, Brants, Muizen, p. 87.
1827. *Mus variegatus*, Brants, Muizen, p. 102.
1829. *Echimys niloticus*, Geoff. et Aud. Deser. Égypte, ii. p. 734 ("Echimys d'Égypte," Atlas, pl. v. fig. 2).
1842. *Arvicanthis niloticus*, Lesson, Nouv. Tab. Règ. Anim. p. 147.
1842. *Mus discolor*, Wagner, Arch. Naturg. i. p. 9.
1843. *Isomys variegatus*, Sundevall, Vet.-Ak. Handl. p. 220.
*Isomys variegatus*, var. *major*, id. ibid.

A very large dark olive-coloured species, with a large massive skull.

Size of body and hind foot larger than in any of the allied forms*. Tail shorter than body. General colour olive-buff, heavily lined with black, the general effect darker than in the *abyssinicus* group. Dorsal stripe generally ill-defined, but in some individuals dark and quite as prominent as in *abyssinicus*. Flanks rather paler and yellower than back. Backs of hands and feet buff-coloured. Under surface of body dirty greyish white, tinted with buff. Ventral surface not sharply marked from flanks. Hairs of belly with dark slate-grey bases and whitish tips. Tail short, colour much as in *testicularis*, rather darker above.

Skull larger and heavier than in any of the other forms dealt with in this paper. Zygomatic region very broad, especially so in the squamosal portion. Occipital breadth greater than in *testicularis*. Palatal cavities long, but not proportionally broader than in the smaller species. Auditory bullæ rather larger than in *testicularis*. Incisors broad and heavy. Molars rather larger than in the Sennaar species, especially $m^3$.

Dimensions in millimetres (measured in the flesh) :—

| | Average of 10 adults. | Max. | Min. |
|---|---|---|---|
| Head and body ..... | 174 | 195 | 150 |
| Tail ..... | 139 | 148 | 130 |
| Hind foot ..... | 35 | 38 | 33 |

Adult skull: greatest length 40 mm.; basilar length 34; condylo-incisive length 39; zygomatic breadth 21·5; inter-orbital constriction 6; squamosal breadth of cranium 16; length of nasals 15·5; palatilar length 19; length of palatal foramina 9; alveolar length of upper molar series 8.

Many adult skulls of *niloticus* are rather smaller than the above dimensions, in some cases the greatest length being only 38 mm.

* *A. rex*, Thos., is not included in this paper, as its affinities are very doubtful. In size it is far greater than any of the species mentioned here (head and body 212 mm., tail 175).

*Type locality.* Egypt.

This species appears to be fairly generally distributed in Northern Egypt ; the Museum collection contains specimens from Cairo, Giza, and the Fayoum. The specimens from the latter locality represent the species described by Lichtenstein as *Hypudæus variegatus*, and are quite similar to the Cairo specimens of *niloticus* ; thus the name *variegatus* must be regarded as a synonym of *niloticus*, and not as referring to any member of the *testicularis* group.

*Mus discolor*, Wagner, is founded on a bleached specimen of *niloticus*, the hind foot, which measures some 36 mm. in length, showing its relation with the large-footed Egyptian species. The type locality is given as Lower Egypt, so there is no difficulty in regarding *discolor* merely as a synonym of *niloticus*.

### (6) *Arvicanthis abyssinicus*, Rüpp.

*Mus abyssinicus*, Rüppell, Mus. Senck. iii. p. 104, pl. vii. fig. 1 (1842).

A medium-sized species, greyish olive in colour, with dorsal stripe usually distinct and tail comparatively short.

Size of body a great deal less than in *niloticus*, averaging only 145 mm. in length ; hind foot rather small (27 mm.), tail short. General colour of dorsal surface greyish olive, lined with black and washed over with buff, the general effect somewhat similar to that of *niloticus*, but lighter and more finely speckled. Flanks rather paler than back. Dorsal stripe usually well marked, though in many cases it is almost lost amidst the black speckling on the back, especially in bleached individuals. Light markings under and behind ears well marked, more so than in any other species ; this feature is especially noticeable in the juvenile pelage, an account of which is given below under *A. zaphiri*. Face with buffy ocular rings and yellowish-orange nasal region. Backs of hands and feet dirty white, tinted with pale buff. Underparts brownish or greyish white mixed with buff ; ventral surface not differentiated at all from flanks, the general colour of the flanks gradually passing into the mixed brownish or greyish white of the belly. Tail short and rather more hairy than in many of the subspecies ; dark above, pale buffy white below.

Skull smaller than in *testicularis* or *niloticus*. Zygoma expanded, not markedly so in the squamosal region. Brain-case short and broad. Auditory bullæ rather more inflated than in the preceding species. Teeth comparatively large ; molar series equal in size to those of *testicularis*.

Dimensions in millimetres (measured in the flesh) :—

| | Average of 10 adults. | Max. | Min. |
|---|---|---|---|
| Head and body ..... | 145 | 165 | 141 |
| Tail ..... | 111 | 122 | 108 |
| Hind foot ..... | 27 | 29 | 25 |

Adult skull : greatest length 35·6 mm. ; basilar length 30 ; condylo-incisive length 33·9 ; zygomatic breadth 18·5 ; inter-orbital constriction 4 ; squamosal breadth of cranium 14 ; length of nasals 13 ; palatilar length 16 ; length of palatal foramina 7·2 ; alveolar length of upper molar series 7·3.

*Type locality.* Simen and Shoa, Abyssinia.

*Arvicanthis abyssinicus* appears to occur over the greater part of Southern Abyssinia. In the Museum collection are two co-types of the species, which, though rather faded, agree very closely with the material more recently collected and from which the above description is taken. In addition to the typical specimens the collection contains representatives of true *abyssinicus* from the following localities :—Holota, Addis Alem, Addis Ababa, Barka Plains, Lake Tsana, Koosa, Sellin, Arrusi Plateau, and Yah-Yah (N.W. Shoa).

*Meriones lacernatus*, Rüpp.*, described from Abyssinia, appears to represent *abyssinicus* in an abnormal condition of pelage, either during a change of fur or else in a state of erythrism. The skin-dimensions (head and body 143 mm., tail 97, hind foot 26·5) are quite similar to those of *abyssinicus*.

(7) *Arvicanthis abyssinicus saturatus*, subsp. n.

A very dark-coloured form, allied to *A. abyssinicus*, Rüpp. In size rather less than in *abyssinicus*, but not markedly so in the general skin-dimensions. Upper surface of body dark blackish, sprinkled with pale greyish buff, the general effect very much blacker than in *abyssinicus* or any of the allied forms. Dorsal stripe well marked, rather more so than is usually the case in the typical species. Flanks similar in colour to back, not paling towards the ventral surface. Face much darker and less buff-coloured, only the ocular rings and tip of nose tinted with pale buff. Ears clothed with dark hairs speckled with pale buff. Light patches under and behind ears as in *abyssinicus*. Backs of hands and feet dark brownish black speckled with buff ; toes blackish brown. Under surface of body blackish brown, washed with pale

* Mus. Senck. iii. pp. 96, 115, pl. vi. fig. 1 (1842).

buff; hairs of belly and throat with slaty-black bases and buffy-white tips. Tail short, rather less hairy than in *abyssinicus*; above dark blackish brown, below dark grey-coloured.

Skull a trifle smaller than in Rüppell's species, nasals rather short.

Dimensions of the type (measured in the flesh) :—

Head and body 136 mm.; tail 112; hind foot 28·5; ear 16.

Skull: greatest length 32·5; basilar length 27·3; condylo-incisive length 31·5; zygomatic breadth 17; interorbital constriction 4·7; squamosal breadth of cranium 13·5; length of nasals 11; palatilar length 15; length of palatal foramina 7; alveolar length of upper molar series 7.

*Hab.* Didessa River, near Guma, Abyssinia.

*Type.* Adult female. B.M. no. 6. 11. 1. 70. Original number 83. Collected on June 5th, 1905, by Ph. Zaphiro, and presented to the British Museum by W. N. McMillan, Esq.

The very much darker and blacker colour of this *Arvicanthis* at once distinguishes it from the greyish olive-coloured *abyssinicus*. It is interesting to note that the young specimens of this new form are quite as dark as the adults, and thus the difference between the young of the two forms is most striking, the young pelage of *abyssinicus* being a great deal paler than in the adult phase. In addition to the type, this new race is represented in the Museum collection by three further specimens, all collected near the type locality, in the Guma district.

(8) *Arvicanthis abyssinicus rubescens*, Wrought.

*Arvicanthis a. rubescens*, Wrought. Ann. & Mag. Nat. Hist. (8) iv. p. 538 (1909).

Very similar in size to *abyssinicus*, hind foot rather larger, colour darker and redder, dorsal stripe less distinct.

Size of body rather larger than that of *abyssinicus* (average length 158 mm.); hind foot large (30 mm.); tail short. General colour darker and more ochraceous than in *abyssinicus*, the whole dorsal surface washed with a rich buff-coloured tint. No light areas behind ears. Face like that of *abyssinicus*, rather richer in colour. Dorsal stripe indistinct, in some cases almost invisible. Backs of hands and feet buff-coloured. Under surface rather lighter than in *abyssinicus*. Tail less hairy, but very similar in colour.

Skull a trifle smaller than that of *abyssinicus*, with smaller molars.

Dimensions in millimetres (measured in the flesh) :—

| | Average of 10 adults. | Max. | Min. |
|---|---|---|---|
| Head and body ..... | 158 | 177 | 142 |
| Tail ..... | 114 | 125 | 105 |
| Hind foot ..... | 30 | 32 | 28 |

Adult skull (type) : greatest length 35 mm. ; basilar length 28·4 ; condylo-incisive length 32·8 ; zygomatic breadth 17·9 ; interorbital constriction 5 ; squamosal breadth of cranium 13·5 ; length of nasals 13·4 ; palatilar length 15·6 ; length of palatal foramina 7·2 ; alveolar length of upper molar series 6·5.

*Type locality.* Kibero, Unyoro, Uganda.

Type in British Museum, no. 2. 11. 1. 16.

In addition to a series from the type locality, this form is represented in the Museum collection by specimens from the following localities :—Burumba (Ankole), Ruwenzori, Entebbe, Mbarara (Uganda), Masaka (Uganda), and Kigezi (Uganda).

This race would also appear to range northwards towards the Bahr-el-Ghazal, as a series of specimens from Lango and Nimule, recent accessions to the collection, undoubtedly represent true *rubescens* ; it is also noted by Heller as occurring near Lado and Gondokoro.

### (9) *Arvicanthis abyssinicus nubilans*, Wrought.

*Arvicanthis a. nubilans*, Wroughton, Ann. & Mag. Nat. Hist. (8) iv. p. 539 (1902).

A medium-sized, dark brownish olive-coloured race, without dorsal stripe.

Size of body, hind foot, and tail about as in the last form. General colour a good deal darker than in *rubescens*, the black ground-colour quite as dark as in *niloticus*. Buff-coloured annulations on hairs well-marked, the general speckled effect about as in the two following races. No trace of dark dorsal stripe in adult pelage. Flanks a good deal paler than back. Backs of hands and feet brownish, speckled with buff. Ventral surface much as in *rubescens*, the white hair-tips rather longer, giving the belly a lighter appearance ; this character, however, is not constant, some specimens of *rubescens* being quite similar to *nubilans* as

regards the ventral colouring. Tail a little longer and more hairy than that of *rubescens*.

Skull very like that of *abyssinicus*, rather heavier in build, with a slightly larger brain-case. Nasals in type specimen shorter than in rest of series.

Dimensions in millimetres (measured in the flesh):—

| | Average of 10 adults. | Max. | Min. |
|---|---|---|---|
| Head and body ..... | 155 | 170 | 140 |
| Tail ..... | 117 | 123 | 115 |
| Hind foot ..... | 29 | 30 | 27 |

Adult skull (type): greatest length 35·5 mm.; basilar length 29·5; condylo-incisive length 33·5; zygomatic breadth 18·3; interorbital constriction 5; squamosal breadth of cranium 14; length of nasals 12·5; palatilar length 16; length of palatal foramina 7; alveolar length of upper molar series 7.

*Type locality*. Kisumu, British East Africa.

Type in British Museum, no. 10. 4. 2. 29.

Specimens belonging to this race have been received from the following localities:—Kisumu, Mumias, and Kirui (Elgon), British East Africa.

### (10) *Arvicanthis abyssinicus nairobæ*, Allen.

1909. *Arvicanthis nairobæ*, Allen, Bull. Am. Mus. N. H. p. 168.
1909. *Arvicanthis abyssinicus nairobæ*, Wrought. Ann. & Mag. Nat. Hist. (8) iv. p. 537.

Smaller in size than any of the preceding forms, with grey-coloured hands and feet and greyish-white under surface.

Size of body small (136 mm.); hind foot and tail short. General colour much as in typical *abyssinicus*, but speckling rather finer. Flanks rather paler than back, washed with buff. No dorsal stripe. Backs of hands and feet greyish. Under surface greyish white, markedly less buff-coloured than in *præceps* or *neumanni*; hairs of belly with long white tips. Tail shorter and less hairy than in the larger forms; upper surface dark blackish brown, underside dirty white.

Skull very similar to that of *nubilans* in general shape, dimensions rather less. Molar teeth narrower than in the preceding species.

Dimensions in millimetres (measured in the flesh) :—

| | Average of 3 adults. |
|---|---|
| Head and body ..... | 135 |
| Tail..... | 107 |
| Hind foot ..... | 27·5 |

Adult skull : greatest length 34·3 mm. ; basilar length 29 ; condylo-incisive length 33 ; zygomatic breadth 18 ; inter-orbital constriction 5 ; squamosal breadth of cranium 13·6 ; length of nasals 13·2 ; palatilar length 15·6 ; length of palatal foramina 7 ; alveolar length of upper molar series 7.

*Type locality.* Nairobi, British East Africa.

In the British Museum are three specimens from the type locality, and from these the above description has been taken.

### (11) *Arvicanthis abyssinicus præceps,* Wrought.

*Arvicanthis a. præceps,* Wroughton, Ann. & Mag. Nat. Hist. (8) iv. p. 538 (1909).

Closely allied to the foregoing form, differing only in the hands and feet being golden yellow and the under surface strongly tinted with buff.

Size of body about as in *nairobæ*, tail rather longer (111 mm.), hind foot a little smaller. General colour of dorsal surface quite similar to that of *nairobæ*. No dorsal stripe. Backs of hands and feet richly tinted with orange-buff. Ventral surface of body dirty greyish white, washed with buff. Tail like that of *nairobæ*, but rather lighter above.

Skull very much like that of *nairobæ*, molars rather smaller, but not markedly so. Brain-case narrow.

The skull measured below is that of an old Baringo specimen.

Dimensions in millimetres (measured in the flesh) :—

| | Average of 10 adults. | Max. | Min. |
|---|---|---|---|
| Head and body ..... | 142 | 152 | 131 |
| Tail ..... | 111 | 116 | 108 |
| Hind foot ..... | 26·6 | 28 | 25 |

Adult skull : greatest length 34·5 mm. ; basilar length 28·3 ; condylo-incisive length 33 ; zygomatic breadth 17·5 ; inter-orbital constriction 5 ; squamosal breadth of cranium 13·5 ; length of nasals 13 ; palatilar length 15·3 ; length of palatal foramina 7 ; alveolar length of upper molar series 6·5.

*Hab.* Naivasha, British East Africa.

*Type.* In British Museum, no. 0. 6. 21. 34.

Mr. Kemp, during Mr. C. D. Rudd's Expedition in British East Africa, collected a large series of this form at Baringo and Rumruti (Laikipia Plateau). A specimen from Nandi, also collected by Mr. Kemp, undoubtedly represents the same race, so that it is evident that *præceps* is widely distributed over this part of East Africa.

(12) *Arvicanthis abyssinicus neumanni*, Matsch.

*Mus neumanni*, Matschie, SB. Ges. naturf. Fr. Berl. 1894, p. 204.

In size about equal to *nairobæ*, but darker and more ochraceous in colour; evidently closely allied to both *nairobæ* and *præceps*.

Size of body and tail about as in *nairobæ*; hind foot rather smaller, average length 26 mm. General colour like that of *præceps*, but richer and darker in colour, the black ground-colour more evident and washed with ochraceous buff, the reddish tint paling on the flanks to yellowish buff. No trace of dorsal stripe. Backs of hands and feet brownish, speckled with buff. Underparts as in *præceps*. Tail like that of *nairobæ*.

Skull rather smaller than in the other races of *abyssinicus*. Auditory bullæ less inflated than in *præceps* or *nairobæ*.

Dimensions in millimetres (measured in the flesh):—

| | Average of 7 adults. | Max. | Min. |
|---|---|---|---|
| Head and body ..... | 139 | 149 | 132 |
| Tail ..... | 106 | 111 | 101 |
| Hind foot ..... | 26 | 27 | 25·5 |

Adult skull: greatest length 32·8 mm.; basilar length 27·5; condylo-incisive length 31·5; zygomatic breadth 17; interorbital constriction 4·8; squamosal breadth of cranium 13; length of nasals 12·4; palatilar length 15; length of palatal foramina 6·6; alveolar length of upper molar series 6·3.

*Type locality.* Burunge, Irangi, south of Kilimanjaro.

The above description is taken from a series of specimens recently collected by Mr. Kemp at Taveta, Kilimanjaro. This southern race was also represented in a collection from Voi; so it is evident that the distribution of *neumanni* extends eastwards from Kilimanjaro towards the coast and southwards towards Mpapua.

The three forms *nairobæ*, *præceps*, and *neumanni* appear to be very closely related to one another, as would be expected

from their geographical distribution, and on this account it is necessary to consider all three forms as representing closely allied geographical races.

The dimensions given by Matschie in his original description of *neumanni* are considerably less than those of the series in the Museum collection from Kilimanjaro and Voi. I cannot, however, find any trace of difference in the general colour described by Matschie and that represented by the Museum series of *neumanni*; and since the localities are comparatively close together, it seems best to accept them as all representing a single race, and any discrepancies in size must be regarded as due to variations in age.

*Pelomys reichardi*, described by Noack * from Karema, Tanganyika, may possibly belong to this group, but at present I am quite unable to determine the affinities of this species. The Museum collection contains no specimens of the *abyssinicus* group from as far south as Tanganyika, the most southern locality represented in the collection being Kilimanjaro.

(13) *Arvicanthis zaphiri*, sp. n.

Similar to *A. abyssinicus*, Rüpp., but with ventral surface lighter in colour and sharply marked off from the flanks.

Size of body much as in *abyssinicus*; hind foot a little larger. General colour of upper surface rather richer than that of *abyssinisus*, especially posteriorly. No light patches behind ears. Dark dorsal stripe absent. Flanks richer and more buffy in colour. Fore feet like those of *abyssinicus*, hind feet rather yellower. Belly whitish, hairs with slate-grey bases and white tips; ventral surface strikingly different from that of *abyssinicus*, the greyish-white belly being rather sharply marked off from the buff-coloured flanks. Faint yellowish stripe down middle of chest and belly.

Skull with anterior portion of brain-case very much broader than in *abyssinicus*; breadth across frontal region, at the fronto-parietal suture (taken outside the supra-orbital ridges), 10 mm., a great deal broader than in *abyssinicus*.

Dimensions of the type (measured in the flesh):—

Head and body 158 mm.; tail 124; hind foot 31; ear 20.

Skull (occipital region broken): length from tip of nasals to occipito-parietal suture 31·5; zygomatic breadth 18; length of nasals 14; greatest breadth across nasals 4; inter-orbital breadth 6; breadth of brain-case (across squamosal region) 15·2; palatilar length 16; width of palate inside

* Zool. Jahrb. 1887, ii. p. 235.

$m^3$ 3; length of palatal foramina 7; alveolar length of upper tooth-row 7.

*Hab.* Guma, Southern Abyssinia. Altitude 2200 feet.

*Type.* Adult male. B.M. no. 6. 11. 1. 33. Original number 85. Collected on May 9th, 1905, by Ph. Zaphiro, and presented to the British Museum by W. N. McMillan, Esq.

This new form appears to be closely related to *A. abyssinicus*, but cannot be regarded as a geographical race of that species, both on account of the distribution of the two forms and the marked differences that exist between them. These differences are especially noticeable in the young individuals, and the following note as to the appearance of the juvenile pelage may be of value in determining the two species.

In *A. abyssinicus* the young specimens are yellowish olive in colour, with a well-marked dark dorsal stripe extending from the forehead to root of tail; shoulders and neck paler than rest of upper surface. Belly greyish buff, the tint gradually darkening towards the flanks, with no sharp line of demarcation between the ventral surface and sides of body. The young of *zaphiri* are brownish speckled with buff, the posterior part of the back tinged with rusty red. No noticeable light area on shoulders or neck. No trace of dorsal stripe. Belly whitish, sharply marked off from the buff-coloured flanks, the contrast between the two areas more vivid in the young than in the adult pelage.

In addition to the type there are three further specimens of *zaphiri* in the Museum collection from the type locality, and these all agree with the above description.

### (14) *Arvicanthis rumruti*, Dollm.

*Arvicanthis rumruti*, Dollman, Ann. & Mag. Nat. Hist. (8) viii. p. 128 (1911).

A small species, apparently intermediate between the *abyssinicus* and *somalicus* groups.

Size smaller than any of the preceding forms; tail short, average length 95 mm. General colour of dorsal surface pale greyish brown, faintly tinted with a light straw-coloured wash; the general effect much greyer and paler than in the *abyssinicus* group. Ears clothed with short grey hairs, a character that at once distinguishes this species from *somalicus*, in which the ears are bright orange. Flanks paler and greyer than back, the grey tint passing fairly abruptly into the white of the ventral surface. Backs of hands and feet

greyish, faintly tinted with pale buff. Under surface of body whitish; hairs with grey bases and white tips. Tail short, coloured much as in *præceps*; ventral surface less buffy.

Skull small, in size hardly larger than that of *somalicus*. Molar teeth much smaller than in the allied species.

Dimensions in millimetres (measured in the flesh) :—

| | Average of 10 adults. | Max. | Min. |
|---|---|---|---|
| Head and body ..... | 132 | 140 | 128 |
| Tail ..... | 95 | 107 | 88 |
| Hind foot ..... | 25·8 | 27 | 23 |

Adult skull (type): greatest length 31·8 mm.; basilar length 26·1; condylo-incisive length 30; zygomatic breadth 16; interorbital constriction 4·3; squamosal breadth of cranium 13·2; length of nasals 12; palatilar length 14·3; length of palatal foramina 7; alveolar length of upper molar series 5·9.

*Type locality.* Rumruti, Laikipia Plateau, British East Africa.

Type in British Museum. Original number 1413. Collected by Mr. Robin Kemp on October 25th, 1910.

The type locality is at present the only district in which this species has been found. It does not appear to occur either at Baringo on the west side or in the Eusso Nyiro district to the east of Rumruti, since Mr. Kemp found only *A. præceps* at Baringo and *chanleri* and *reptans* in the Eusso Nyiro district. Probably this small Rumruti species is confined to the high altitudes of the Laikipia Plateau.

### (15) *Arvicanthis somalicus*, Thos.

*Arvicanthis somalicus*, Thomas, P. Z. S. 1902, ii. p. 312.

In size about equal to *rumruti*; general colour sandy buff, mixed with brownish black.

Size of body and tail about as in the foregoing species; hind foot rather smaller, average length 24 mm. General colour pale sandy buff, lined with black and pale brown. Flanks paler and yellower than back. Nose, ocular rings, and ears orange-buff. Backs of hands and feet buffy white. Ventral surface of body white, hairs with grey bases and white tips. Flanks fairly distinctly marked off from belly, though this character is not evident in the type, which appears to be rather a bleached specimen. Tail short and similar in colour to that of the Rumruti species.

Skull small, rather less than in *rumruti*. Brain-case and auditory bullæ much smaller than in the *abyssinicus* group.

Dimensions in millimetres (measured in the flesh) :—

| | Average of 8 adults. | Max. | Min. |
|---|---|---|---|
| Head and body ..... | 127 | 134 | 120 |
| Tail ..... | 99 | 108 | 94 |
| Hind foot ..... | 24 | 25 | 23 |

Adult skull (type) : greatest length 30·4 mm. ; basilar length 26 ; condylo-incisive length 29·9 ; zygomatic breadth 16 ; squamosal breadth of cranium 12 ; interorbital constriction 5 ; length of nasals 12·7 ; palatilar length 14·3 ; length of palatal foramina 6·5 ; alveolar length of upper molar series 6.

*Type locality.* Shuk, Northern Somaliland.

Type in British Museum, no. 97. 12. 3. 9.

Since this species was described Dr. Drake-Brockman has presented to the Museum a series of *Arvicanthis* from Upper Sheikh, Somaliland, and these specimens, although rather richer in colour than the type, apparently represent the true *somalicus*.

### (16) *Arvicanthis reptans*, Dollm.

*Arvicanthis reptans*, Dollman, Ann. & Mag. Nat. Hist. (8) viii. p. 129 (1911).

The smallest species of the *abyssinicus* group at present known ; allied to *somalicus*.

Size of body small, average length 114 mm. ; tail and hind foot much as in *somalicus*. General colour above pinkish brown speckled with black, the black tint most evident down the middle of the back. Flanks rather more buff-coloured than back, sharply marked off from the white ventral surface. Hairs of back with black bases, buff-coloured subterminal rings, and dark tips. Ocular rings, nose, and ears bright orange-buff. Backs of hands and feet light buffy orange. Under surface of body greyish white tinted with buff. Tail as in *somalicus*, dark blackish brown above and light buff below.

Skull like that of *somalicus*, but smaller and less elongate. Molar teeth rather small.

Dimensions in millimetres (measured in the flesh) :—

| | Average of 10 adults. | Max. | Min. |
|---|---|---|---|
| Head and body ..... | 114 | 121 | 100 |
| Tail ..... | 97 | 111 | 87 |
| Hind foot ..... | 24 | 25 | 22·5 |

Adult skull (type): greatest length 29 mm.; basilar length 24; condylo-incisive length 26; zygomatic breadth 16; interorbital constriction 4·8; squamosal breadth of cranium 12; length of nasals 11; palatilar length 12·5; length of palatal foramina 6; alveolar length of upper molar series 6.

*Type locality.* Nyama Nyango, Eusso Nyiro, East Africa.

Type in British Museum. Original number 1787. Collected by Mr. Robin Kemp on January 25th, 1911.

This species is represented in the Museum collection by a long series of specimens from the type locality and the Chanler Falls, Eusso Nyiro. It is evidently allied to the Somaliland species, as shown by its small size and pale pinkish-buff colouring.

### (17) *Arvicanthis chanleri*, Dollm.

*Arvicanthis chanleri*, Dollman, Ann. & Mag. Nat. Hist. (8) viii. p. 130 (1911).

A large-sized species of the *somalicus* group, allied to *reptans*.

Size rather larger than in *somalicus*; tail markedly longer (122 mm.). General colour much as in *reptans*, rather lighter and yellower, the black ground-colour less dominant. Ears, nose, ocular rings, and backs of hands and feet orange-buff. Flanks washed with a rich buffy tint. Ventral surface white tinged with buff. Tail as in *somalicus*.

Skull larger than that of *somalicus*, in general proportions equalling that of the *abyssinicus* group.

Dimensions of the type (measured in the flesh) :—

Head and body 131 mm.; tail 122; hind foot 25; ear 14·5.

Adult skull (type): greatest length 34 mm.; basilar length 27; condylo-incisive length 31; zygomatic breadth 17; interorbital constriction 4·8; squamosal breadth of cranium 12·4; length of nasals 11·7; palatilar length 14·2; length of palatal foramina 6·6; alveolar length of upper molar series 6·5.

*Type locality.* Chanler Falls, Eusso Nyiro, East Africa.

Type in British Museum. Original number 1769. Collected by Mr. Robin Kemp on January 23rd, 1911.

Mr. Kemp collected three further specimens of this species in the Eusso Nyiro district.

## XLIII.—*On the Ruteline Coleoptera of Ceylon, with Descriptions of new Species.* By Gilbert J. Arrow.

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In a list of eleven species of Rutelinæ from Ceylon, published by my friend Dr. Ohaus in 1900, the author has remarked that all but a single species (of *Adoretus*) occur also upon the mainland of India. Dr. Ohaus's list, of course, was not intended as a complete one, and his determinations require revision; but, lest the statement referred to should be regarded by any student of zoogeographical or faunistic problems as containing a general principle, it seems desirable to emphasize the fact that the study of much ampler materials than those available to Dr. Ohaus has produced results pointing in an opposite direction.

Having had the opportunity of studying fairly numerous examples of the Rutelinæ of Ceylon collected by Messrs. E. E. Green, George Lewis, W. Braine, and others, I have been able to draw up a list of nearly treble the length of that of Dr. Ohaus, and with considerable surprise, in view of my previous study of the Cetoniinæ and Dynastinæ of the island, I have found that the very large majority of the species are peculiar to Ceylon, so far as can be at present determined. Of the whole number of thirty-one species here enumerated, only seven can be said with certainty to occur elsewhere. This large proportion of indigenous species will probably be found to recur in the Melolonthinæ, but is quite at variance with that found in the Cetoniinæ and Dynastinæ, and, the habits of all these subfamilies being similar, seems to imply a comparatively recent evolution of species in the present group. Most of the Ceylon Rutelinæ have close allies on the mainland, but only in the case of *Anomala superflua*, *illusa*, and *chloronota* is there difficulty in their separation. A few, like *Anomala variegata* and *chloromela*, are rather isolated forms.

Eight or ten species of the genus *Adoretus* known to me have been excluded from the present paper because Dr. Ohaus is now engaged upon a revision of that genus, and the Ceylonese species probably include representatives of several proposed new genera yet unnamed and undefined.

The large tropical genera, *Anomala*, *Mimela*, *Parastasia*, and *Adoretus*, all having representatives peculiar to Ceylon, it is surprising to find the very abundant and widespread

genus *Popillia* represented there only by the common South-Indian species *P. complanata*. Judging by the common occurrence of that species, this cannot be attributed to any unfavourable local conditions, but must be supposed to be due to the late migration southwards of the genus.

*Rhinyptia meridionalis*, sp. n.—Peradeniya. Occurs also in Travancore.

*Micranomala cingalensis*, Arrow.—Colombo. A closely related species occurs in South India, and a third in Tenasserim. Genus and species have been recently described by me (Ann. & Mag. Nat. Hist. (8) viii. 1911, p. 268).

*Anomala* (subg. *Spilota*) *variegata*, Walk. (*princeps*, Kr.). —Pundalu-oya.

*A. chloromela*, sp. n.—Ambalangoda.

*A. dussumieri*, Bl.—Colombo, Kandy, Peradeniya, Dikoya. This also occurs in Southern India.

*A. chloronota*, sp. n.—Trincomalee, Peradeniya, Hiniduma, Mamadu. No doubt this is the insect recorded by Dr. Ohaus as *A. perplexa*, Hope, to which it is very closely related.

*A. discalis*, Walker.—A quite distinct and apparently rare species.

*A. varicolor*, Gyll.—Peradeniya, Nilgata.—This is a very variable and widely distributed Indian insect.

*A. discors*, Karsch.—I do not know this, but Dr. Ohaus has very kindly examined for me the type in the Berlin Museum, and he tells me that the species is nearly related to *A. varicolor*, and quite wrongly called *Rhinoplia* by Karsch. Dr. Ohaus has also seen examples from South India.

*A. conformis*, Walker.—The type in the British Museum remains unique.

*A. pellucida*, sp. n.—This is described from South India as well as Ceylon.

*A. walkeri*, Arrow (=*humeralis*, Walker).—Common in many parts of the island. It is no doubt the species recorded by Dr. Ohaus as *A. ypsilon*. That species is an inhabitant of Java.

*A. gravida*, sp. n.—Colombo, Ambalangoda. Closely related to *A. walkeri*, but larger.

*A. infantilis,* sp. n. — Diyatalawa, Madulsima, Kelani Valley.

*A. superflua*, sp. n.—Colombo, Peradeniya. This is probably the form referred to by Dr. Ohaus as *A. varians,* under which name are at present comprised a number of excessively similar species.

*A. illusa,* sp. n.—Trincomalee. This is a second Ceylonese species of the group just mentioned.

*A. fracta,* Walk.

*A. hamifera,* Walk.—Hakgala.

*A.* (subg. *Singhala*) *tenella,* Bl.—A very common little insect injurious to tea-plants.

*A.* (subg. *Singhala*) *hindu,* Hell.—Kandy, Peradeniya, Ambalangoda.

*A.* (subg. *Singhala*) *vidua,* Hell.—I do not know this species.

*A. infixa,* Walk.—The type of this is unknown and the species is unrecognizable.

*Mimela macleayana,* Vig.—Wellawaya. This is a South-Indian species.

*M. mundissima,* Walk.—Colombo, Maskeliya, Dikoya. Referred to by Dr. Ohaus as *M. xanthorrhina,* Hope, the name of its representative in South India.

*Popillia complanata,* Newm.—This is an abundant species in Southern India.

*Parastasia basalis,* Cand.—Colombo, Peradeniya.

*P. cingala,* Arr.—Dikoya.

*Adoretus singhalensis*, Ohaus.—Kandy, Maskeliya.

*A. mavis,* sp. n.—Bogawantalawa.

*A. leo,* sp. n.—Ohiya.

*A. ursus,* sp. n.—Hakgala.

*Rhinyptia meridionalis,* sp. n.

Elongato-ovata, pallide testacea, fronte, prothoracis vittis duabus obliquis, sutura elytrorumque marginibus posticis extremis nigris; corpore supra polito, nudo, clypeo impunctato, breviter rostrato, fronte crebre punctato; prothorace sat lato, modice punctato, lateribus leviter arcuatis; scutello punctato; elytris sat fortiter

striato-punctatis; pygidio grosse punctato; tibiis anticis tridentatis, dente supero obtuso.

Long. 12·5–13·5 mm.; lat. max. 6–7 mm.

*Hab.* Ceylon: Peradeniya (*E. E. Green*, Oct. and Nov. 1910); Travancore (*N. Annandale*): Pallode (20 miles N.E. of Trivandrum), Maddathoray, Tenmalai (W. slopes of Western Ghats).

Pale testaceous, with the clypeus and tarsi red, the head, the suture and posterior margins of the elytra, and an oblique mark on each side of the pronotum near the base black. The sutural stripe is generally dilated around the scutellum, and in well-marked individuals there is an additional black mark upon the apical callus of each elytron. In pale specimens the thoracic marks disappear.

The shape is elongate-oval and the whole body is very smooth and shining, with very scanty hairs beneath. The clypeus is glossy and almost unpunctured, with its sides convergent to the point of flexure, the median carina very sharp, and the rostrum short, with the front margin rounded. The forehead is finely and closely punctured. The pronotum is broad, convex, moderately finely and closely punctured, and gently rounded at the sides. The scutellum bears a few punctures and the elytra are regularly and moderately strongly striate-punctate, the second row of punctures breaking up in its anterior half. The pygidium is deeply and coarsely punctured, the metasternum coarsely punctured and thinly hairy. The front tibia is tridentate, the uppermost tooth being very obtuse and feeble. The larger claw of the front foot is cleft.

The extremity of the front tibia is sharper in the male, but the two sexes otherwise differ little.

This species closely resembles *R. suturalis*, Kraatz, but is rather larger and may be easily distinguished by its smooth shining clypeus.

*Anomala chloromela*, sp. n.

Læte viridis, clypeo, pronoti lateribus, elytrisque pallidioribus, corpore subtus pedibusque aureo-rufis, metasterni lateribus tibiisque extus plus minusve viridibus; late ovalis, convexa, nitida, pectore breviter pubescenti; clypeo lato, antice fere recto, rugose punctato, fronte dense punctato; pronoto sat crebre punctato; scutello paulo punctato; elytris parum dense aut profunde punctatis, anguste membranaceo-marginatis; pygidio minute irregulariter punctato; metasterni lateribus crebre punctatis, medio polito, mesosterno breviter acute producto.

Long. 17–18 mm.; lat. max. 10–10·5 mm.

*Hab.* Ceylon: Ambalangoda (*E. E. Green*, March 1911).

Bright grass-green, with the clypeus, lateral margins of the prothorax and elytra pea-green, and the lower surface and legs golden red, with the sides of the metasternum and outer edges of the tibiæ more or less green.

The body is compact, oval, convex, and very smooth and shining. The clypeus is broad, nearly straight in front, and finely and rugosely punctured, the clypeal suture straight and impressed, and the forehead densely punctured. The pronotum is rather closely and strongly punctured, especially at the sides; it is strongly rounded laterally, with the front angles rather sharp and the hind angles right angles. The base is broadly rounded in the middle and not margined. The scutellum is finely and sparingly punctured. The elytra are rather scantily and shallowly punctured, the punctures becoming rather coarse at the sides and apices, and most of them forming imperfect longitudinal lines. The marginal membrane is narrow. The pygidium is finely and rather irregularly punctured. The metasternum is densely punctured and hairy at the sides, smooth and shining in the middle, and there is a short but sharp mesosternal process. The front tibia is strongly bidentate, and the longer claw of the front and middle tarsi is cleft.

♂. The inner front claw is broad, acute, and strongly angulated at the middle of its lower edge.

This is an interesting connecting-link between those forms which have a mesosternal process and the *Euchlora* group, in which there is none, but to which *A. chloromela* has in all other respects the closest resemblance.

*Anomala chloronota*, sp. n.

Obscure viridis vel olivacco-viridis, pronoti lateribus anguste, pygidio postice nonnunquam, corpore subtus femoribusque viridescenti- vel aureo-flavis, tibiis tarsisque saturate viridibus, metallicis; ovalis, convexa, corpore supra omnino densissime sat minute punctato, elytrorum punctis inæqualibus, nonnunquam confluentibus, lineis longitudinalibus vix perspicuis, marginibus posticis anguste membranaceis; pygidio haud dense strigoso, vix piloso; metasterni lateribus dense punctatis, breviter pubescentibus, medio nitido, mesosterno haud producto.

Long. 15–20 mm.; lat. max. 9–11·5 mm.

*Hab.* Ceylon: Trincomali, Peradeniya, Mamadu, Hiniduma, Colombo, Kelani Valley.

Rather deep green, sometimes becoming olivaceous upon the elytra, with the extreme lateral margins of the pronotum,

the whole of the lower surface, the femora, and often the posterior part of the pygidium yellow, with a faint metallic tinge, and the tibiæ and tarsi deep metallic green.

The body is compactly oval and convex and very densely punctured over the whole upper surface. The clypeus and forehead are very deeply and densely punctured, the clypeus broad and nearly straight in the middle. The pronotum and scutellum are finely punctured, the punctures very dense on the former and becoming coarser at the sides. The elytra are equally densely and rather more coarsely punctured, with slight indications of longitudinal rows of punctures. The marginal membrane is extremely narrow. The pygidium is moderately closely rugosely punctured, and bears very scanty setæ, and the metasternum is densely punctured and thinly pubescent at the sides.

This species is one of the numerous very closely similar forms of the *Euchlora* group related to *A. perplexa*, Hope. It is almost identical in size, shape, and coloration to that, but the membranous margins of the elytra are narrower and the pygidium less hairy. *A. malabariensis*, Bl., is also very similar, but smaller and more elongate, with the front angles of the prothorax sharper, the elytra with distinct rows of punctures larger than the rest, the pygidium densely rugose, and the tibiæ and tarsi slightly coppery instead of green.

### *Anomala pellucida*, sp. n.

Pallide testacea, capite, tibiis posticis, tarsis omnibus, pronoti margine postico, scutelli elytrorumque marginibus extremis angustissime rufis; breviter cylindrica, convexa, polita; capite minute rugoso, clypeo antice verticeque punctatis; prothorace subtiliter punctato, lateribus fortiter curvatis, angulis anticis acutis, posticis fere rotundatis; scutello subtilissime punctato, apice vix angulato; elytris profunde striatis, striis crebre punctatis; pygidio modice punctato, metasterno crebre punctato, parce hirto; pedum anticorum tibiis fortiter bidentatis, ungue majori fisso:
♂, clava antennali longa, ungue antico majori paulo dilatato.
Long. 16–18 mm.; lat. max. 9–10 mm.

*Hab.* S. India: Madura; Ceylon.

Pale testaceous yellow, with the head (except an undefined pale patch on each side of the clypeus), the hind tibiæ, tarsi, and extreme edges of the scutellum, elytra, and base of the pronotum reddish.

The insect is broadly cylindrical and convex. The head is finely rugose, with the anterior part of the clypeus and the hinder part of the vertex shining and distinctly punctured.

The clypeus is short, with strongly reflexed margins, and broadly rounded at the sides. The pronotum is lightly punctured, strongly rounded at the sides, with the front angles acute and the hind angles rounded, and the base margined and slightly prominent in the middle. The scutellum is lightly punctured and scarcely angulated at the apex. The elytra are deeply striated, with the striæ closely punctured, the subsutural one broken up at the base and the interstices very smooth and rather convex. The pygidium is finely but rather deeply punctured, and the metasternum closely punctured and thinly hairy. The front tibia is strongly bidentate and the larger claw of the front tarsus cleft.

The antennal club is long in the male and the inner front claw a little dilated.

Ceylonese specimens in the British Museum are from two different sources, but the precise locality has not been recorded. A single male was found by Mr. T. R. Bell in Madura.

It is a larger and more robust and convex insect than *A. testacea*, Bl., and distinguished also by its red head and hind tibiæ. The general colour is very pale and the abdomen of the dry specimens is peculiarly transparent. The œdeagus of the male is exceptionally short and simple in shape.

### *Anomala gravida*, sp. n.

Late cylindrica, testacea, clypeo tarsisque rufis, fronte, elytrorum sutura et marginibus extremis humerisque nigris; capite dense punctato, clypeo brevi, late arcuato, oculis mediocris; prothorace lato, minute sat crebre punctato, lateribus arcuatis, basi marginato; scutello minute punctato; elytris fortiter striato-punctatis; pygidio metasternoque fortiter crebre punctatis; tibiis anticis 3-dentatis, dente supero obtuso; pedum anticum ungue majori fisso.

Long. 18 mm.; lat. max. 10 mm.

*Hab.* Ceylon: Kelani Valley (near Colombo, *W. Braine*); Labugama (*E. E. Green*); Balangoda, 1776 ft. (*G. Lewis*).

Testaceous, with the clypeus and tarsi reddish, and the forehead, the suture and margins of the elytra, and a spot on each shoulder black.

The body is broadly cylindrical and not very convex. The clypeus and head are finely and densely, the former rugosely, punctured. The clypeus is short, not very narrow, with the front margin broadly rounded and not very strongly reflexed. The pronotum is short, finely punctured,

margined all round and gently rounded at the sides. The scutellum is finely punctured. The elytra are deeply punctate-striate, the second stria dividing in the anterior half. The pygidium and metasternum are rather strongly and closely punctured. The front tibia is 3-dentate, but the uppermost tooth is very feeble. The larger claw of the front foot only is cleft.

♂. The club of the antenna is rather long.

This species belongs to the *pallida* group, and is closely allied to *A. walkeri*, Arrow, also a Ceylonese species, which is smaller and devoid of the black markings of *A. gravida*. It is still more like the South-Indian *A. communis*, Burm., but larger, with the eyes rather smaller and the clypeus less narrow.

### *Anomala infantilis*, sp. n.

Testacea, capite, pronoti medio (plerumque linea angusta medio divisa), scutello, elytrorum marginibus basalibus et suturalibus (circum scutellum paulo dilatatibus), tibiarum apicibus tarsisque nigris vel fuscis, clypeo rufo; elongata, sat parallela, depressa, capite valde punctato, clypeo parvo, transverso, margine antico fere recto; pronoto modice punctato, lateribus parcius, marginibus lateralibus omnino valde arcuatis, angulis anticis acutis, posticis vix distinctis, basi subtilissime trisinuato, marginato; scutello minute punctato; elytris fortiter punctato-striatis; pygidio fortiter inæqualiter punctato, parcissime piloso; metasterni lateribus fortiter sat crebre punctatis, parce pilosis; pedum anticum tibiis distincte 3-dentatis, ungue majori fisso.

Long. 9–10 mm.; lat. max. 4·5–4·75 mm.

*Hab.* Ceylon: Madulsima, Diyatalawa (*T. Bainbrigge Fletcher*), Kelani Valley (*Andrewes Coll.*).

Testaceous, with the head, the pronotum (except an irregular outer margin, and generally a very narrow median line), the scutellum, and the basal and sutural margins of the elytra (dilating around the scutellum) black or brown. The clypeus, the extremities of the tibiæ, and the tarsi are reddish. The body is moderately elongate, rather parallel-sided, and depressed. The head is strongly punctured, the clypeus small, with the front margin strongly reflexed and nearly straight in the middle. The eyes are large and the antennæ long. The prothorax is moderately finely and closely punctured. The lateral margins are strongly and regularly curved, the front angles acute, and the hind angles not distinct. The scutellum is minutely punctured and the elytra strongly punctate-striate, the second stria being disrupted at the base and the fifth and eighth generally more

or less irregular. The pygidium is strongly but not very closely punctured, and bears a few long hairs. The sides of the metasternum are rather closely punctured and thinly pubescent, and the abdomen is coarsely punctured, each segment bearing a transverse row of stiff bristles. The front tibia is 3-dentate and the inner front claw only is cleft.

The inner front claw of the male is dilated but very acute, and the antennal club is very long.

This is a very small species of the *pallida* and *communis* group, to which *A. walkeri* and *gravida* also belong, but it differs from all others in having the scutellum and the greater part of the pronotum dark.

*Anomala superflua*, sp. n.

Pallide testacea, capite nigro, pronoti basi scutello elytrisque angustissime nigro-marginatis, clypeo, tibiis posticis tarsisque omnibus fusco-rufis; elongata, parallela, capite toto minute et creberrime punctato, pronoto scutelloque subtilissime punctatis, illo modice confertim, basi anguste marginato; elytris haud profunde aut crebre seriato-punctatis, spatio subsuturali irregulariter punctato, marginibus externis sat late membranaceis; pygidio minutissime punctato; tibiis anticis 3-dentatis, dente supero obtuso.

Long. 19–22·5 mm.; lat. max. 10–11·5 mm.

♂. Pedum anticum tibia apice acuminata, ungue majori leviter dilatato.

♀. Pedum anticum apice paulo clavato.

*Hab.* Ceylon: Peradeniya, Sigiriya, Colombo.

Pale testaceous, with the head and the extreme edges of the pronotum, scutellum, and elytra black, and the clypeus (very deeply), the hind tibiæ, and all the tarsi red.

The body is elongate, with the elytra only very slightly wider in the middle than at the shoulders, smooth but not very shining above, and scarcely convex. The head is entirely very densely punctured, the clypeus nearly straight in front, with the sides slightly converging. The pronotum is extremely minutely and rather evenly punctured, finely but deeply margined all round, with the sides angulated near the middle, the front angles acute and the hind angles obtuse. The scutellum is finely punctured and the elytra lightly but a little more coarsely, most of the punctures, except in the broad subsutural interstice, forming rather indistinct lines. The pygidium is finely and irregularly punctured, the metasternum closely punctured and clothed with short erect pubescence at the sides, scantily punctured and pubescent in the middle. The abdomen is nearly smooth. The front

tibia has three teeth and the larger claw of the front and middle feet is cleft.

The tibial teeth of the male are short but not sharp. The terminal tooth in the female is stout and strongly bent outwards.

This is not easily distinguishable from *A. elata*, F., except by means of the genitalia of the males, but the clypeus is of slightly different shape, its sides being gently convergent, and the elytra are long and parallel-sided, with relatively broad membranous margins, especially at the posterior lateral part. The œdeagus of the male is constricted just before the end and the paramera are divergent and globularly swollen at the apices.

*Anomala illusa*, sp. n.

Ad *A. elatam* et *superfluam* maxime affinis, sed paulo robustior, pedibus brevioribus et crassioribus, capite minus dense punctato, clypeo minori, distincte haud crebre punctato, tibiis anticis latis, dente tertio obsolescenti, pedum 4 posteriorum tibiis brevibus, medio inflatis, tarsorum articulis 4 basalibus transversis, latis.
Long. 22 mm.; lat. max. 12 mm.

*Hab.* Trincomali (*E. E. Green*, Sept. 1910).

This has the closest possible similarity to *A. elata*, F., and *A. superflua*, Arr., but it is rather broader and more convex and a little more shining, the head is less densely punctured, the clypeus narrower and less flat and opaque, and the legs are stouter, all the tibiæ being shorter and broader and the basal joints of the middle and hind tarsi more compact. The third tibial tooth is almost obsolete. The œdeagus of the male has the paramera simply rounded externally and the ventral lobe bluntly pointed.

I know only a single male of this species.

*Adoretus mavis*, sp. n.

Rufo-brunneus, subtus plerumque plus minusve infuscatus, fronte prothoraceque lævissime metallicis; corpore crasso, supra undique flavido-setoso, setis adpressis, modice congestis; scutello confertissime vestito, singulo elytro seriebus 4 fasciculorum longitudinalibus, pilisque erectis rarissime sparsutis, ornato, corpore sat crasso, clypeo semicirculari, rugoso, fronte grosse punctato, pronoto modice brevi, crebre (lateraliter subrugose) punctato, lateribus æqualiter arcuatis, angulis anticis acutis, posticis valde obtusis, elytris crebre haud minute punctatis, lineis geminatis interruptis nonnullis, pygidio rugose punctato, metasterni lateribus crebre, medio parcissime, punctatis; tibiis anticis acute 3-dentatis.
Long. 13–14 mm.; lat. max. 6–7 mm.

*Hab.* Ceylon: Bogawantalawa (4900–5200 feet, *G. Lewis*).

It is a large, rather massive species, moderately closely clothed with decumbent whitish setæ, which are very dense upon the scutellum and form four longitudinal rows of closer agglomerations upon the elytra, which also bear a very few erect scattered hairs. There is a slight metallic lustre upon the anterior part of the body. The clypeus is semicircular and rugose and the forehead coarsely punctured. The prothorax is moderately short, strongly and rather closely punctured, and at the sides rather rugosely. The lateral margins are continuously rounded, the front angles acute and the hind angles indistinct. The elytra are closely and rather coarsely punctured, with narrow indistinct costæ coinciding with the rows of patches of agglomerated setæ. The pygidium is rugosely, the sides of the metasternum densely, and its middle very sparsely, punctured. The front tibia is rather sharply tridentate.

The eyes of the male are rather larger, the clypeus of the female a little longer, and the apex of the abdomen slightly indented beneath in the latter.

*Adoretus leo*, sp. n.

Castaneo-rufus, elytris (marginibus exceptis) læte flavis, marginibus lateralibus sat late rufis, capite et pronoto leviter metallicis; corpore modice elongato, supra convexo, haud dense flavido-setoso, setis adpressis decumbentibus, elytris nitidis, pilis raris erectis, marginibus posticis cum pygidio dense setosis; clypeo haud parvo, granuloso-rugoso, margine semicirculari, fronte grosse et crebre punctato, pronoto modice brevi, fortiter punctato, lateribus arcuatis, angulis anticis acutis, posticis obtusis; scutello sat dense punctato et setoso; elytris leviter punctatis, lateraliter fortius, lineis punctorum geminatis indistinctis; pygidio subtiliter punctato, metasterni lateribus dense variolosis, medio lævi.

Long. 12–13 mm.; lat. max. 6–7 mm.

*Hab.* Ceylon: Ohiya (*E. E. Green*, Nov. 1907).

Chestnut-red, with the elytra bright yellow, except the margins, which are rather broadly red externally and very narrowly along the base and suture. The head and prothorax are lightly metallic. The body is moderately elongate and convex, and clothed with decumbent whitish setæ, which are rather scanty above, except at the apical margins of the elytra and the pygidium. There are also a few scattered erect hairs. The clypeus is fairly large, rugose, with the margin semicircular, and the forehead is strongly and closely punctured. The pronotum is moderately short,

coarsely and closely punctured, with the sides rounded, the front angles acute and the hind angles obtuse. The scutellum is moderately closely punctured and setose, and the elytra are rather lightly punctured, except at the sides, with slightly indicated double rows of regular punctures. The pygidium is finely punctured, the sides of the metasternum are closely pitted and the middle smooth.

The front tibia of the male bears two sharp teeth and a very feeble upper one, and the pygidium is convex, with an almost smooth area at the apex.

The front tibia of the female has three teeth, the pygidium is flattened and slightly emarginate at the apex.

The clypeus scarcely differs in the two sexes.

*Adoretus ursus*, sp. n.

Brunneus, elytris nonnunquam aliquando flavis, marginibus infuscatis, capite pronotoque leviter metallicis; corpore elongato parum convexo, griseo-setoso, sat nitido, scutelli setis densis, elytrorum pilis raris erectis nonnullis; clypeo parvo, rugoso, margine semicirculari, valde reflexo, fronte fortiter punctato; pronoto grosse punctato, nitidissimo, lateribus arcuatis, angulis anticis acutis, posticis obtusis; elytris crebre punctatis, lineis punctorum indistinctis geminatis; pygidio haud fortiter, metasterni lateribus dense, punctatis et hirsutis; tibiis anticis 3-dentatis.

Long. 12–13 mm.; lat. max. 5·5–6·5 mm.

*Hab.* Ceylon: Hakgala (*E. E. Green*, March and April, 1907).

Reddish brown, with the clypeus and elytra generally lighter in colour, the latter with dark margins. It is elongate in shape and rather shining, the forehead and prothorax being slightly metallic. It is clothed with greyish setæ, which are dense upon the scutellum and moderately close upon the apices of the elytra and the pygidium, but elsewhere rather scanty. The elytra bear a few erect hairs. The clypeus is not large, rugose, with the margin semicircular and very strongly reflexed, and the forehead is very coarsely punctured. The pronotum is very shining, very strongly punctured, with the lateral margins rounded, the front angles acute and the hind angles obtuse. The elytra are rather closely punctured, with indistinct double lines of punctures. The pygidium and the sides of the metasternum are clothed with long hairs, the former rather lightly and the latter more strongly and closely punctured. The front tibia is tridentate.

I only know males of this species.

## XLIV.—*Note on a Crayfish from New Guinea.*

By W. T. Calman, D.Sc.

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Among the Crustacea collected by the British Ornithologists' Union Expedition to New Guinea are nine specimens of crayfish from the Mimika River, the characters of which seem to cast doubt on the validity of some of the species that have been described from this part of the world.

The following is a list of the species hitherto recorded from New Guinea and adjacent islands :—

*Cheraps albertisii* (= *Astaconephrops albertisii*, Nobili). Katau, near mouth of Fly River *.

*C. lorentzi*, Roux. Manikion District; Etna Bay; Sabang on the Lorentz (Noord) River †.

*C. aruanus*, Roux. Arru Islands ‡.

*Astacopsis australasiensis* (H. Milne-Edwards). Sorong Island, Galewo Strait §.

In the case of the last of these species some doubt may still be entertained as to the locality, on account of its remoteness from the type-locality of the species (Sydney). The remaining species are all very closely related, as Roux has shown, to *Cheraps quadricarinatus* (v. Martens) ‖, the unique type-specimen of which came from Cape York. *C. albertisii*, also known only from a single specimen, differs from the others in having three, instead of two, pairs of spinules on the rostrum, a character to which Dr. Roux very justly attributes only a provisional value. Apart from this, the species are distinguished solely on the ground of differences in the proportions of the chelæ. Such characters are known, in other crayfishes, to vary greatly according to sex and age, and Dr. Roux was only led to attribute specific value to them in this case from the "fixité remarquable" observed in the proportions of the chelæ in specimens of the

* Nobili, Ann. Mus. Civ. St. Nat. Genova, xl. 1899, p. 244, and Boll. Mus. Zool. Torino, xviii. No. 445, 1903, p. 1, fig.; Roux, Zool. Anz. xxxvii. 1911, p. 104, and Notes Leyden Mus. xxxiii. 1911, p. 98.

† Roux, Notes Leyden Mus. xxxiii. 1911, p. 97, figs. 4 & 5.

‡ Roux, *t. c.* p. 88, figs. 2 & 3.

§ Nobili, Ann. Mus. Civ. St. Nat. Genova, xl. 1899, p. 246, and Boll. Mus. Zool. Torino, xviii. No. 445, 1903, p. 2.

‖ MB. Ak. Wiss. Berlin, 1868 (1869), p. 617.

same sex, throughout a large series of the Arru Island form.

It is to be observed, however, that the measurements given by Dr. Roux show this constancy to be far from absolute, and that there is even some overlapping, as regards this character, between *C. aruanus* and *C. lorentzi*. If the measurements of the chelæ be reduced to the ratio Length : Breadth of chela, we get the following results :—

| | | |
|---|---|---|
| *C. aruanus* | ♀ | 2·66 to 3·2. |
| | ♂ | 1·9 to 2·68. |
| *C. lorentzi* | ♀ | 2·8 *. |
| | ♂ | 2·45 to 2·84. |
| *C. quadricarinatus* | ♀ | 4·0. |
| *C. albertisi* | ♀ | 4·23. |

The specimens now examined, from the Mimika River †, give further evidence of the untrustworthiness of the chela-form as a specific character. In the males the range of variation exceeds that recorded either for *C. aruanus* or for *C. lorentzi*, and while none of the females have chelæ quite so slender as those of *C. quadricarinatus* or *C. albertisii*, some of them help to reduce the gap between these and the forms described by Dr. Roux.

The following is a list of the specimens, with some of the more important measurements :—

| | Total length. | Length of Right Chela. | Breadth of Right Chela. | Ratio Length : Breadth of Chela. |
|---|---|---|---|---|
| | mm. | mm. | mm. | mm. |
| ♂ .... | 153 | 45 | 13·5 | 3·33 |
| ♂ .... | 150 | 49·5 | 17 | 2·91 |
| ♂ .... | 146 | 63 | 24 | 2·62 |
| ♂ .... | 110 | 36·5 | 14 | 2·60 |
| ♂ .... | 107 | 34 | 14 | 2·42 |
| ♂ .... | 85 | .. | .. | .. |
| ♀ .... | 133 | 40 | 12 | 3·33 |
| ♀ .... | (132) ‡ | 39 | 13·5 | 2·88 |
| ♀ .... | 104 | 26 | 8 | 3·25 |

In seven of the specimens which have the rostrum uninjured it has two pairs of lateral spinules, but in one (♂ 85 mm. length) it has two spinules on one side and three on the other. It seems clear therefore that no importance can be attached to the presence of three pairs of spinules as distinguishing *C. albertisii*.

* From Roux's fig. 5.

† This locality comes within the range of *C. lorentzi* as indicated by the stations quoted above.

‡ Rostrum broken.

Dr. P. Revilliod of the Basel Museum, in the absence of Dr. Roux, has been good enough to send me a fine specimen of *C. aruanus*. I have compared this carefully with the Mimika specimens without discovering any differences of importance, except in the form of the chelæ.

The only crayfish of this group which I have seen from the mainland of Australia is a small specimen from Adelaide River (N. coast of Australia, about 131° E. long.). It is a female, 52·5 mm. in length, with the general characters of *C. quadricarinatus*. The right chela measures 14·5 mm. by 5 mm., giving a ratio of 2·9.

While it is possible, and even probable, that the examination of further material might lead to the recognition of local races or varieties among the forms of *Cheraps* here dealt with, there seems to be no evidence at present to justify the specific separation of any of them from *Cheraps quadricarinatus* (v. Martens).

In one other point, of some interest, the Mimika specimens supplement the descriptions of Dr. Roux. He found, both in *C. aruanus* and *C. lorentzi*, a curious modification of the chelæ in the males, a larger or smaller area on the outer margin having the exoskeleton soft, uncalcified, whitish, and somewhat swollen. This modification was found in all males, the relative extent of the soft area increasing with age. The Mimika specimens confirm the statement that the modified chelæ are only found in the male sex, but they show that it does not apply to all males, and that the degree of modification is not directly related to the size of the specimens. The largest male in the collection (153 mm. length) has no trace of softening in the chelæ and only a streak of lighter colour along the outer edge. A specimen 150 mm. long has the light coloration more marked and more sharply defined, but without any softening. Specimens of 146 and 107 mm. length respectively have the soft area fully developed and swollen, much as in Roux's figure of *C. aruanus*, and one of 110 mm. differs only in that the area does not extend so far towards the proximal end and is rather less swollen. While it would be rash to base any conclusions on so small a series of specimens, the suggestion may be hazarded that we have here a case of "alternating dimorphism" similar to that discovered by Faxon in the males of the genus *Cambarus*, but not hitherto recognized in any other crayfish.

## XLV.—*Descriptions of Two new African Barbels.*

By G. A. Boulenger, F.R.S.

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### *Barbus somereni.*

Depth of body $3\frac{2}{3}$ times in total length, length of head $4\frac{1}{4}$ times. Snout rounded, 3 times in length of head; eye 5 times in length of head, interorbital width $2\frac{2}{3}$ times; mouth subinferior, its width $2\frac{2}{3}$ times in length of head; lips moderately developed, lower continuous across the chin; two barbels on each side, anterior $1\frac{1}{4}$, posterior $1\frac{1}{2}$ diameters of eye. Dorsal III 10, equally distant from occiput and from root of caudal, border straight; last simple ray strong, bony, not serrated, shorter than head. Anal III 5, not reaching caudal. Pectoral $\frac{4}{5}$ length of head, not reaching ventral; latter below anterior rays of dorsal. Caudal peduncle $1\frac{2}{3}$ times as long as deep. Scales longitudinally striated, $33\frac{5\frac{1}{2}}{5\frac{1}{2}}$, 3 between lateral line and ventral, 12 round caudal peduncle. Brownish above, whitish beneath (has been in formaline).

Total length 205 mm.

A single specimen, now in the British Museum, was obtained by Dr. van Someren in the Sebwe River, a snow-water stream on Mount Ruwenzori, in Uganda, at an altitude of 6000 feet.

The higher number of scales and the shorter spine of the dorsal fin well distinguish this new species from *B. hindii*, Blgr., one of the few Barbels with as many as 10 branched rays in the dorsal fin.

### *Barbus aboinensis.*

Depth of body 3 to $3\frac{1}{3}$ times in total length, length of head $3\frac{1}{3}$ to $3\frac{1}{2}$ times. Snout rounded, as long as eye, which is $3\frac{1}{3}$ to $3\frac{1}{2}$ times in length of head; interorbital width $2\frac{2}{3}$ to 3 times in length of head; mouth subinferior, small; lips moderate; two barbels on each side, anterior a little shorter than eye, posterior as long as or a little longer than eye. Dorsal III 8, equally distant from centre or posterior border of eye and from caudal, border slightly concave; last simple ray not enlarged, not serrated, a little shorter than head. Anal III 5, not reaching caudal. Pectoral $\frac{3}{4}$ length of head, not reaching ventral; base of latter below anterior rays of dorsal. Caudal peduncle $1\frac{1}{2}$ times as long as deep. Scales

radiately striated, 23–25$\frac{31}{31}$, 2–2$\frac{1}{2}$ between lateral line and ventral, 12 round caudal peduncle. Brown above, yellow beneath, with a blackish lateral streak and a round black spot at the base of the caudal fin ; dorsal, anal, and ventrals orange ; a black spot usually present in the upper part of the anterior half of the dorsal.

Total length 80 mm.

Numerous specimens from Omalu, headwaters of the Aboina River, affluent of the Cross River, Southern Nigeria, presented by Major G. E. Bruce.

Allied to *B. callipterus*, Blgr.

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XLVI. — *Descriptions of Three new Snakes discovered by Mr. G. L. Bates in South Cameroon.* By G. A. Boulenger, F.R.S.

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*Typhlops batesii.*

Snout very prominent, rounded, with inferior nostrils. Rostral large, the width of its upper portion about half that of the head, the portion visible from below longer than broad ; nasa semidivided, the cleft proceeding from the first labial ; præocular present, much narrower than the nasal or the ocular, in contact with the first, second, and third labials ; eyes hidden ; præfrontal much enlarged, larger than the supraocular ; four upper labials. Diameter of body 39 or 40 times in the total length ; tail broader than long, ending in a spine. 28 scales round the body. Yellow ; dorsal and lateral scales edged with dark olive-brown.

Total length 390 mm.

Three specimens from Bitye.

Allied to *T. obtusus*, Peters.

*Gonionotophis microps.*

Eye small, its diameter less than its distance from the mouth. Rostral once and a half as broad as deep, visible from above ; internasals about two-thirds as long as the præfrontals ; frontal a little shorter than its distance from the end of the snout, much shorter than the parietals ; loreal as long as deep or a little longer than deep ; one præ- and one or two postoculars ; temporals 1 + 2 ; seven upper labials,

third and fourth entering the eye; four or five lower labials in contact with the anterior chin-shields, which are a little longer than the posterior. Scales rather feebly keeled, lower row smooth, in 15 rows (19 on the neck). Ventral 210–211; anal entire; subcaudals 47–54. Upper parts and outer ends of ventral shields dark olive or blackish, lower parts yellowish; subcaudals edged with dark olive.

Total length 560 mm.; tail 75.

Two female specimens from Bitye. One of them had swallowed a snake of its own species.

Well distinguished from *S. granti*, Gthr., which occurs in Northern Nigeria, by the smaller eye and the short loreal.

ELAPOCALAMUS, g. n.

Maxillary short, with few teeth, the last feebly enlarged and grooved and situated below the eye. Head very small, not distinct from neck; eye minute, with round pupil; nostril is a single nasal, which is in contact with a præocular and separated from the rostral by the first labial, which forms a suture with the internasal; no anterior temporal. Body cylindrical, very slender; scales smooth, without pits, in 15 rows; ventrals rounded. Tail very short, ending in a very obtuse point; subcaudals in two rows.

Near *Miodon*, A. Dum.

*Elapocalamus gracilis.*

Snout broadly rounded. Rostral small, broader than deep, not visible from above; internasals a little longer than broad, a little longer than the præfrontals; frontal as long as broad, twice as broad as the supraocular, shorter than its distance from the end of the snout, much shorter than the parietals; one præ- and one postocular; six upper labials, third bordering the eye, fifth forming a suture with the parietal; a pair of chin-shields, separated from the symphysial by the first lower labial. Ventrals 296; anal divided; subcaudals 25. Dark brown above, with 5 black longitudinal lines and interrupted light lines on the scales between them; snout, occiput, and end of tail yellow; lower parts, involving one and a half rows of scales on the sides, yellowish.

Total length 285 mm.; tail 18.

A single specimen from Bitye.

XLVII.—*Descriptions of Three new Freshwater Fishes discovered by Mr. G. L. Bates in South Cameroon.* By G. A. Boulenger, F.R.S.

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*Labeo batesii.*

Body strongly compressed, its depth $3\frac{2}{3}$ times in total length. Head 4 times in total length, its width $\frac{2}{3}$ its length; snout rounded, a little broader than long; eye superolateral, in second half of head, $4\frac{1}{2}$ times in length of head, slightly over twice in interorbital width; width of mouth, with lips, $\frac{1}{2}$ length of head; upper lip entire, lower feebly fringed, both with transverse plicæ on the inner surface; rostral flap denticulate; a small barbel, hidden in folds of skin; snout covered with scars of nuptial tubercles. Dorsal III 10, equally distant from nostrils and from caudal, border very feebly notched, longest ray as long as head. Anal II 5, reaching root of caudal. Pectoral as long as head, not reaching ventral, the first ray of which falls below the seventh of dorsal. Caudal deeply notched. Caudal peduncle as long as deep. Scales $37\frac{5\frac{1}{2}}{6\frac{1}{2}}$, 4 between lateral line and ventral, 16 round caudal peduncle. Olive above, whitish beneath; fins dark.

Total length 190 mm.

A single specimen from the Kribi River.

Allied to *L. cyclorhynchus*, Blgr.

*Clarias esamesæ.*

Depth of body 7 times in total length, length of head 5 times. Head $1\frac{2}{3}$ times as long as broad, smooth above; occipital process angular; frontal fontanelle $1\frac{1}{2}$ times as long as broad; occipital fontanelle smaller, partly on occipital process; eye 3 times in length of snout, $5\frac{1}{2}$ times in interorbital width; band of præmaxillary teeth barely 3 times as long as broad; vomerine teeth granular, forming a large fan-shaped patch, the longitudinal diameter of which a little exceeds the width of the præmaxillary band. Nasal barbel a little longer than head; maxillary barbel $1\frac{1}{2}$ length of head; outer mandibular barbel as long as nasal, inner shorter; maxillary and mandibular barbels papillose at the base. 14 gill-rakers on first arch. Clavicles exposed, striated. Dorsal 85, its distance from occipital process $\frac{2}{5}$ length of head. Anal 73. Dorsal and anal extending to

root of caudal. Pectoral $\frac{1}{2}$ length of head, the spine serrated on both sides. Ventral $1\frac{1}{2}$ times as distant from caudal as from end of snout. Caudal $\frac{1}{2}$ length of head. Dark brown.

Total length 160 mm.

A single specimen from Esamesa (Congo basin).

Closely allied to *C. macromystax*, Gthr.

*Pelmatochromis kribensis.*

Teeth in two series. Depth of body 3 times in total length, length of head $3\frac{1}{4}$ to $3\frac{1}{3}$ times. Snout rounded, with convex upper profile, as long as eye, which is $3\frac{1}{4}$ to $3\frac{1}{3}$ times in length of head and equals interorbital width; maxillary extending to below anterior border of eye; 3 series of scales on the cheek. Gill-rakers short, 10 or 11 on lower part of anterior arch. Dorsal XVI–XVII 8–9; spines gradually increasing in length to the last, which measures about $\frac{1}{3}$ length of head; longest soft rays shorter than head. Anal III 6–7; third spine nearly $\frac{1}{2}$ length of head. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head. Ventral produced into a filament. Caudal rounded-subacuminate. Caudal peduncle a little deeper than long. Scales smooth, 27–29 $\frac{2}{9}$; lat. lines $\frac{18-20}{5-3}$. Olive above, whitish beneath; a blackish opercular spot; soft dorsal often with a round black spot behind the last spine; caudal sometimes with two black, light-edged ocellar spots above; outer edge of ventrals blackish.

Total length 65 mm.

Several specimens from the Kribi River.

Closely allied to *P. taeniatus*, Blgr., and *subocellatus*, Gthr.

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## XLVIII.—*On some Fishes of the Family* Pœciliidæ.

By C. Tate Regan, M.A.

### 1. *A new* Xiphophorus *from Guatemala.*

*Xiphophorus rachovii,* sp. n.

Depth of body about 3 in the length, length of head 4 to $4\frac{1}{2}$. Snout somewhat shorter than eye, the diameter of which is 3 to $3\frac{1}{2}$ in the length of head; interorbital width equal to the distance from eye to edge of operculum. 26 or

27 scales in a longitudinal series. Dorsal 11–13; branched rays subequal in length or slightly decreasing backwards. Anal 9–10. Least depth of caudal peduncle less than the distance from end of dorsal to base of caudal fin. Olivaceous; 2 or 3 brownish longitudinal stripes at the edges of the series of scales on the sides of the body; dorsal and caudal fins yellow at the base; a pair of conspicuous blackish spots, one above and one below, at the base of the caudal fin.

Six examples, 40 to 65 mm. in length, of this pretty little aquarium fish have been sent to me by Herr A. Rachow, of Hamburg. They came from Porto Barrios, on the Atlantic coast of Guatemala, between Lake Yzabal and the Rio Motagua. This new species is closely related to *X. brevis*, Regan, from British Honduras.

### 2. *The Pœciliid Fishes of Celebes and Lombok.*

The Pœciliid fishes known from Celebes belong to two species—*Haplochilus celebensis*, M. Weber (Zool. Ergebn. iii. 1894, p. 426), which seems from the description to be a true *Haplochilus*, and *H. sarasinorum*, Popta (Notes Leyden Mus. xxv. 1905, p. 239), for which I propose the new generic name *Xenopœcilus*. The small scales and the 7-rayed pelvic fins distinguish *Xenopœcilus* from both *Haplochilus* and *Panchax*. It appears to resemble *Haplochilus* in the high position of the pectoral fins and the non-protractile mouth, but is nearer *Panchax* in the form of the mouth, which has a distinct lateral cleft, and in the dentition, the jaws being furnished with bands of teeth.

That Celebes should possess a peculiar genus of Pœciliid fishes is not surprising; but Professor Max Weber attaches some importance to the presence in this island of a species of the Asiatic genus *Haplochilus*, which he regards as true fresh-water fishes. But Day ('Fishes of India,' p. 522) has pointed out that the species of *Panchax* and *Haplochilus* occur in lowland streams and estuaries, rarely far from the sea, and Duncker (Mitteilung. Naturhistorisch. Mus. Hamburg, xxi. 1904, p. 171) has recorded *Haplochilus javanicus*, Bleek., as a brackish-water fish. It seems probable that the species of *Haplochilus*, like so many Pœciliidæ, sometimes enter the sea, or, at least, that salt water does not constitute an impassable barrier for them.

A species of *Haplochilus* has been recorded from Lombok (M. Weber, Res. Expéd. Néerl. Nouvelle Guinée, Zool. v. 1907, p. 218), but seems never to have been exactly determined or described.

## XLIX.—*New African Mammals.*

By Oldfield Thomas.

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### *Crocidura butleri*, sp. n.

A medium-sized species, with a short, white, incrassated tail.

Fur soft and fine; hairs of back rather less than 4 mm. in length. General colour above near "drab-grey," the usual grey of the upper surface with a certain suffusion of "écru drab." Under surface soiled buffy, the hairs brownish slaty for three-fourths their length, their tips cream-buff, which gives a rather unusual yellowish appearance to the whole underside; no line of demarcation on sides. Lateral gland prominent, short-haired, cream-buff. Hands and feet white. Tail short, very much incrassated throughout, its hairs, both shorter and longer, white or with a slight buffy tinge.

Skull of nearly the same length as that of specimens from the same place referred by Mr. Wroughton to *C. sericea*, Sund., but the brain-case is markedly shorter. Second and third unicuspids subequal in area, the former the higher of the two.

Dimensions of the type (measured on the skin) :—

Head and body 78 mm.; tail 34; hind foot 13.

Skull: condylo-incisive length 24; anterior breadth 7·6; posterior breadth 9·9; interorbital breadth 4·5; upper tooth-row 10·5; tip of postglenoid process to hinder end of condyle 9·4*.

*Hab.* Between Chak Chak and Dem Zubeir, Bahr-el-Ghazal.

*Type.* Adult male. B.M. no. 8. 4. 2. 10. Original number 33. Collected 7th March, 1907, and presented by A. L. Butler, Esq.

This striking little shrew, which I have named in honour of its discoverer, is readily recognizable by its short, whitish, incrassated tail and its more or less buffy underside.

### *Tatera hopkinsoni*, sp. n.

A rather small species, with unusually short broad feet.

Size decidedly less than in the other Gambian species,

* This measurement, easily taken with exactitude, gives an idea of the length of the brain-case. The direct measurement on the upper surface is less easy to take accurately.

*T. gambiana*. General colour pale, dorsal area darkened. Feet short in proportion to the size of the animal and unusually broad, so as to give them the appearance of those of a rat rather than of a gerbil. Tail about as long as head and body, practically untufted, brown above, darkening to black terminally, sides buffy, under surface whitish.

Skull short, broad, shaped more as in *T. giffardi* than in the other West-African species, in which it is larger and narrower. Interorbital region flat, its edges but little ridged, strongly divergent, forming distinct postorbital angles. Posterior palatal foramina fairly long. Bullæ very small for those of a true *Tatera*.

Dimensions of the type (measured in flesh) :—

Head and body 150 mm.; tail 147; hind foot 30; ear 16.

Skull: greatest length 36; condylo-incisive length 33; zygomatic breadth 18·5; nasals 14·8; interorbital breadth 6; breadth of brain-case 15·5; palatilar length 17·3; palatal foramina 6·7; bullæ, greatest horizontal diameter 10; upper molar series 6·1.

*Hab.* Gambia. Type from Kudang; alt. 100′.

*Type*. Adult female. B.M. no. 11. 7. 24. 4. Original number 8. Collected 16th May, 1911, and presented by Dr. E. Hopkinson, after whom I have named the species. Three specimens examined.

This gerbil is probably most nearly allied to the *T. giffardi* of Gambaga, Gold Coast Hinterland, but is distinguished by its smaller and narrower molars and smaller bullæ. From all the other West-African species it is readily separable by its rat-like feet and short broad skull.

*Epimys walambæ pedester*, subsp. n.

Foot much longer than in true *E. walambæ** of Rhodesia and S. Congo.

General characters quite as in *walambæ*. Colour near "raw umber" above, smoke-grey below. Feet less white than in true *walambæ*, near "smoke-grey," each hair on them grey basally, whitish terminally. Tail thinly haired, its underside little lighter than its upper.

Skull with the characteristic widely spread zygomata, large bullæ, and large teeth distinguishing *walambæ* from *hindei, medicatus*, and their allies.

* *Mus walambæ*, Wroughton, Mem. Manchester Lit. & Phil. Soc. li. pt. ii. p. 21 (1907).

Dimensions of the type, teeth unworn (measured in the flesh) :—

Head and body 165 mm.; tail 138; hind foot 31; ear 20.

Skull: greatest length 37; condylo-incisive length 35·7; greatest breadth 19·8; nasals 14·5; interorbital breadth 5·5; palatilar length 18; palatal foramina 9·8; upper molar series 7·1.

*Hab.* Kigezi, Mfumbiro region, S.W. Uganda. Alt. 6000′.

*Type.* Young adult female. Original number 1985. Collected 10th April, 1911, by Robin Kemp. One specimen.

Of twelve specimens of *E. walambæ*, mostly of greater age, from various localities in Rhodesia and Southern Congo, not one has a hind foot approaching within 4 or 5 mm. the length of the foot in the present animal, which evidently represents a distinct longer-footed form. The skull does not appear to differ in any respect.

*Lophuromys prittiei*, sp. n.

A long-tailed species of the *L. woosnami* group.

General proportions about as in *L. woosnami*, though the animal is a little larger, the feet longer, and the tail is a little shorter than the head and body, instead of being usually a little longer. Fur and colour just as in *L. woosnami*, except that the isolated yellowish hairs which sprinkle the coat of that species are almost entirely absent.

Skull rather longer than that of *L. woosnami*. Interorbital region of different shape, the true interorbital part lengthened at the expense of the intertemporal, the distance from the anterior corner of the orbit along the rounded supraorbital border to the point where the latter cuts the postorbital ridge 5 mm. as compared with about 3·5. The ridges themselves not evenly divergent, but concave outward to a point on the fronto-parietal suture, where a postorbital angle is formed. Bar below anteorbital foramen rather more normal than in *L. woosnami*, broader (1·9 mm. as compared with 1·6), its anterior edge more convex. Palatal foramina not penetrating so far backward, their hinder end level with the middle of the middle cusp of the front lamina of $m^1$.

Dimensions of the type (measured in flesh) :—

Head and body 114 mm.; tail 110; hind foot 25·2; ear 21·5.

Skull: greatest length 32; condylo-incisive length 28·7; zygomatic breadth 14·5; nasals 14·6; interorbital breadth 6·5;

breadth of brain-case 13·2; palatilar length 13·3; palatal foramina 6·3; upper molar series 4·6.

*Hab.* Mfumbiro region, S.W. Uganda. Type and paratype from Kigezi. Alt. 6000′. Another from Marutianga, 8200′ (*Prittie*).

*Type.* Adult male. Original number 2022. Collected 21st April, 1911, by Robin Kemp.

This species appears to be the representative in the Mfumbiro Mountains of the *L. woosnami* of Ruwenzori. It was first obtained (in February 1911) by Capt. the Hon. F. R. D. Prittie, of the Anglo-German Boundary Commission, to whom the Museum owes a number of specimens, and in whose honour I have named it.

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## L.—*Two new Eastern Bats.*

By Oldfield Thomas.

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### *Taphozous granti*, sp. n.

Allied to *T. saccolaimus*. Colour reddish brown. Skull smaller and proportionally broader.

Size rather less than in *saccolaimus*. No radio-metacarpal pouch. Gular sac represented in female by a sharply defined naked space on the throat, with distinct edges; no doubt there is a well-developed pouch in the male. Fur short; hairs of back about 3–4 mm. in length, those of the sides of the neck about 5 mm. Distribution of fur apparently as in *saccolaimus*. General colour above deep reddish brown ("burnt umber"), mottled with a number of irregular whitish patches; bases of hairs paler. Under surface paler brown (near "russet").

Skull decidedly shorter than that of *saccolaimus*, but much broader in proportion, the zygomatic breadth equalling that in the larger skull. Forehead not deeply excavated. Postorbital processes of type very long. Posterior palate with the median palatal notch (palation) decidedly posterior to the lateral palatal edges, as in *T. saccolaimus*, all other species that I have been able to examine having the palation level with or anterior to the lateral palatal edges. Posterior part of floor of mesopterygoid fossa smooth, without the deep sharp median groove found in *T. saccolaimus*; sphenoid pits

large, not very deep, their median dividing ridge comparatively low, not rising nearly as high as the floor of the mesopterygoid fossa. Bullæ rather small.

Dimensions of the type (the starred measurements taken in the flesh) :—

Forearm 71 mm.

Expanse *480 ; head and body *89 ; tail *24 ; ear *18 ; tragus *5 ; third finger, metacarpus 67, first phalanx 27·5.

Skull : greatest length 21·7 ; condylo-basal length 21 ; basi-sinual length 17 ; zygomatic breadth 16 ; interorbital breadth 7·8 ; palato-sinual length 7·2 ; front of canine to back of $m^3$ 10·1.

*Hab.* Paramau, Mimika R., S. Dutch New Guinea. Low country.

*Type.* Adult female. Original number 2516. Collected 10th November, 1910, by C. H. B. Grant during the B.O.U. Expedition to New Guinea ; presented by the Subscribers.

This distinct species is no doubt most nearly allied to *T. saccolaimus*, but is readily recognizable by its smaller size, different colour, shorter and broader skull, and by the detailed cranial characters above described. I have named it in honour of my colleague Mr. W. R. Ogilvie-Grant, by whom the Expedition to New Guinea was initiated, and to whom we owe the very acceptable collection of mammals obtained by its members.

### *The large Japanese Noctule.*

The large form of *Nyctalus* found in Japan was named "*Vespertilio molossus*" by Temminck in the 'Fauna Japonica,' but that name was antedated and invalidated by the earlier *Vespertilio molossus* of Pallas (1767).

In 1878 Dobson assigned the name *lasiopterus* to it, from Schreber's plate lviii. B, dating from 1781, and this identification, unlikely as it seemed, might have had to be adopted were it not that Fischer (1829) and Wagner (1840), with equal rights as "revisers," placed the name as a synonym of *noctula*, asserting that it was an old individual. Dobson's specimen, moreover, proves on examination to be not the Japanese, but the large Italian form, to which the name *maximus* has been applied.

Whether Fischer and Wagner's assignation of *lasiopterus* to *noctula* should be adopted, or whether any evidence connecting it definitely with *maximus* may turn up, is for the moment immaterial, although personally I believe it to have been the latter animal. Indeed, Dobson's specimen, from the Lidth de Jeude collection, and therefore probably in

Schreber's time in the Seba Museum, may have been the actual example from which the plate was drawn.

But in any case the name *lasiopterus* is not applicable to the Japanese species, which will need a new one, and may be called *Nyctalus aviator*.

A type specimen may be selected, of which the essential dimensions are as follows :—

Forearm 62 mm.

Skull : condylo-basal length 21·2 ; basi-sinual length 15·7 ; greatest postorbital breadth 9·6 ; intertemporal constriction 5·7 ; posterior breadth 14·2 ; palato-sinual length 7·1 ; front of canine to back of $m^3$ 8·5.

*Hab.* (of type). Tokyo, Hondo, Japan. Other specimens from Tokyo and Nagasaki in Japan, and from Sha-wei-shan Island, off the mouth of the Yang-tze. Miller has also recorded the species from Korea.

*Type.* Adult male. B.M. no. 5. 1. 4. 5. Collected April 30th, 1904, by H. Ogawa, and presented by R. Gordon Smith, Esq.

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## LI.—*On a new Pedipalp from Burma.*

By S. Hirst.

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*Hypoctonus birmanicus*, sp. n.

♂. Structure of both the upper and lower surface of the *body* almost exactly as in *H. binghami*, Oates.

*Chela* more slender and smoother than is the case in *H. binghami* ; its femur and tibia smooth and shining above and practically smooth below also, only a few weak and scattered granules being present on the lower surface (and more numerous granules on the inner surface) of these segments. Dorsal surface of hand smooth, shining, and without any granules, but a number of punctures are present on it ; the inner edge is granular. [In *H. binghami* the lower surface of the femur and tibia is coarsely granular, and a number of distinct granules are present (to the inner side of) the dorsal surface of these segments and on the hand.] Tibial apophysis longer than that of the male of *H. binghami*, but very similar in shape ; its length exceeds the greatest width, but is much less than the length of the tibia. A

distinct apical tooth, which is very similar to that which is present in the female of *H. formosus*, Butler, is present on the outer side of the hand below, and a dentiform granule is present on this tooth (fig.).



*Hypoctonus birmanicus*, sp. n. Chela of male.

*Ommatoids* elongate-ovate, instead of round as in *H. binghami*; they are separated from one another by a space which is less than their width.

*Measurements in mm.*—Total length 23; length of tibia of chela 5; length of its apophysis 3, of the hand 4·25.

*Colour* the same as *H. binghami*, the legs pale red throughout their length.

*Material.* An adult male and two immature female specimens from Pegu, Burma (Horst Coll. ?).

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## LII.—*On Two new Wood-boring Beetles* (Ipidæ).

By Lieut.-Col. Winn Sampson, F.E.S.

It is now nearly two years ago that I began an exhaustive examination of the Ipidæ (until recently called Scolytidæ) contained in the British Museum collection, to which have recently been added the specimens collected by Mr. G. Lewis in Japan and Ceylon. Mr. Ernest Green has also been good enough to send a small number collected by himself in the latter country.

The first description now given is from a specimen in the Fry Collection, the second from two specimens in Mr. Green's last consignment.

### *Eccoptopterus limbus*, sp. n.

Differt ab *E. scaspinoso*, Motsch., truncaturæ elytrorum ambitu spina una valida compluribusque minoribus acutis elevatis infra ornatis. Declivitate elytrorum fortiter squamulis hirtis vestita.

Patria Perak.

Long. 3¼ mm.

One specimen (♂) in the British Museum.

In this species the number of large spines is reduced from three to one on each side of the upper margin of the elytral depression, followed by several (7–8) smaller ones extending down to the sutural apex on each side. The declivity is very densely covered with stout, short, squamose hairs of a pale yellow colour.

As it appears that Eichhoff's generic name of *Platydactylus* was preoccupied (Hagedorn, Deutsch. ent. Zeitschr. 1909, p. 733), Dr. Hagedorn has suggested the name *Eurydactylus*, and has made it a subgenus of *Xyleborus* (Coleopt. Catal. Ipidæ, 1910, p. 98). Eichhoff, however, separated *Platydactylus* from *Xyleborus*, and suggested that his *Xyleborus abnormis* (which is identical with Motschoulsky's *Eccoptopterus sexspinosus*) was most likely of the genus *Platydactylus*. This Mr. Blandford confirms (Ind. Mus. Notes, vol. iii. no. 1, p. 64).

From Mr. Blandford's note on the genus *Eccoptoptera*, Chaud. (Ent. Month. Mag. series 2, vol. iv., 1893) it is evident that Motschoulsky's use of the name *Eccoptopterus* was fifteen years previous to the use of *Eccoptoptera* by Chaudoir; and this is sufficient to prevent the use of any later generic name than the one Motschoulsky gave, and it appears to me better treated as a genus than as a subgenus of *Xyleborus*.

Mr. Blandford mentions (Ann. & Mag. Nat. Hist. ser. 6, vol. xv., April 1895, pp. 323–4) that specimens of *E. sexspinosus*, Motsch., from Batchian and New Guinea possess one or two smaller spines on the lateral border of the elytral declivity, and that in a specimen from Borneo there are five spines on each elytron. He also adds that these subsidiary denticles are not constant, nor even symmetrical; and though they do not occur in any Ceylonese or Burmese examples, they do not appear to be indicative of a new species.

Dr. Hagedorn has described (Deutsch. ent. Zeitschr. 1908, Heft, iii. p. 377) *Platydactylus sexspinosus*, Motsch., var. *multispinosus* (nov. var., Haged.), as having, besides the three strong spines, several (3–5) smaller ones.

In the species I now describe the difference in the spines is much greater (four of the large ones being absent), and the appearance of the declivity is quite unlike that of *E. sexspinosus*, Motsch.

As at present known, the distribution of this genus appears to be: New Guinea, Batchian, Damma Is., Celebes, Philippines (Manila), Java, Borneo, Sumatra, Perak, Ceylon (in coffee- and cacao-beans), Burma (in rice-plants), German East Africa, Kamerun.

Some specimens lately received from Mr. Green from Ceylon as attacking *Albizzia moluccana* and *Hevea brasiliensis* were found, I understand, in the Botanical Gardens, and therefore their country of origin must remain in doubt. Out of ten specimens found by Mr. Green in a dead branch of *Albizzia moluccana,* one proved to be *E. sexspinosus* (♂), Motsch., and the remainder *Xyleborus asperatus,* Bldf., an insect of similar sculpture and general form. It seems therefore highly probable that these may be the sexes of the same species.

### Cnestus, gen. nov.

Caput rotundatum, obtectum; oculi transversi; antennæ scapus longus, funiculus 4-articulatus, articulis 2–4 transversis, latitudine crescentibus; clava magna, ovalis, oblique apice truncata. Prothorax quam elytris longior, ultra caput productus et tuberculis multis magnis ornatus. Scutellum parvum. Elytrorum disco pallido. Abdomen normalis. Coxæ antice approximatæ; femora pallida; tibiæ fuscæ, antice extus serratæ, a basi antrorsum dilatatæ et oblique truncatæ; tarsi elongati.

The prothorax is continued anteriorly downwards and then upwards beyond the head, and is edged with a series of large tubercles. The elytra are almost transparent, except at the edges and along the suture, where they are very dark in colour.

That the immaturity of the elytra is only apparent seems to be proved by the appearance of the other parts of the insect.

I have been unable to dissect the mouth-parts owing to scarcity of material.

### *Cnestus magnus,* sp. n.

Oblongo-ovalis, nitidus, niger, elytris (marginibus exceptis) pallidis; thorace antice granulato-asperato et instructo tuberculis octo, postice profunde punctato; elytris subtilissime punctato-striatis; striis juxta suturalibus fortiter punctatis; corpore toto sparsim hirto.

Long. 3 mm.

*Hab.* ? Ceylon.

This insect was taken by Mr. Ernest Green from living branches of *Albizzia moluccana.* The prothorax is longer than the elytra by the length of the overhanging apical portion, strongly asperate and tuberculate in front, and posteriorly covered with large punctures somewhat widely separated, the intervening spaces being very shiny; there is

a sharp division between the pronotum and the sides of the prothorax.

The large prothorax extending beyond the head, with its anterior fringe of eight stout tubercles, four on each side of a median interval (the two nearest the interval on each side being the largest), and the transparency of the elytra serve to separate this insect from any other of the Ipidæ known to me. The head is concave in front, with a semicircular row of pale hairs above the mouth, rugulose and hairy behind. The difference in colour of the femora and tibiæ is more marked than in *Xyleborus fornicatus*.

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## LIII.—*Rhynchota from the Solomon Islands.*

By W. L. Distant.

Mr. W. W. Froggatt collected on these islands during July and August, 1909. He kindly sent me representatives of his collection for identification and description, and the following is a list of the species thus obtained. All the specimens and types are now in the British Museum.

### Heteroptera.

*Austromalaya ornatula*, sp. n. | *Axiagastus cambelli*, Dist.

### Homoptera.

*Peggiona nigrifinis*, Walk.
*Zoraida scutellaris*, Walk.
*Ricania lutescens*, sp. n.
*Euricania translucida*, Montr.
—— *discigutta*, Walk.
*Euricania gloriosa*, sp. n.
*Armacia atrofascialis*, sp. n.
*Sephena punctulosa*, sp. n.
*Clovia froggatti*, sp. n.
*Tartessus solomonensis*, sp. n.

### Genus Austromalaya.

*Spudæus*, Dall. List Hem. i. p. 168 (1851), nom. preocc.
*Austromalaya*, Kirk. Entomologist, 1908, p. 124, n. nom.

Type, *A. reticulata*, Westw.

### *Austromalaya ornatula*, sp. n.

Pitchy brown, shining, corium opaque; head above with a purplish tint, and with a short, central, longitudinal, basal fascia and a curved line before each eye, ochraceous; antennæ black; pronotum with a central, longitudinal, pale ochraceous line; scutellum centrally ochraceous, attenuated posteriorly

to near apex, which is dull ochraceous ; corium with a small irregular spot, or sometimes minute spots, with another short straight line, situate near apical margin, ochraceous ; head beneath and sternum metallic purplish black, area of the odoriferous apertures black, opaque; abdomen beneath centrally testaceous, outwardly broadly margined with pale ochraceous, followed by a black submarginal fascia including the stigmata, the extreme lateral margin ochraceous; posterior margin of apical segment and the genitalia black ; legs black, bases of femora more or less ochraceous; head very coarsely punctate, with the apex of the central lobe prominent; antennæ with the first joint shorter than head, but passing its apex, first and second subequal, third and fourth long and subequal (fifth mutilated in typical specimen); pronotum thickly, coarsely, reticulately punctate, the anterior lateral margins crenulate, the lateral angles moderately angularly but not spinously produced; scutellum coarsely punctate, more sparingly so on the ochraceous area, the apex nearly impunctate; corium thickly finely punctate; membrane passing abdominal apex; rostrum reaching the fourth abdominal segment, second and third joints subequal in length ; angles of the apical abdominal segment strongly spinously produced; connexivum distinctly spinous at the lateral apices of the segments.

Long., ♂ 18 mm.; exp. pronot. angl. 9 mm.

## Genus Ricania.

*Ricania*, Germ. Mag. Ent. iii. p. 221 (1818).

Type, *R. fenestrata*, Fabr.

### *Ricania lutescens*, sp. n.

Head, pronotum, and mesonotum pale castaneous ; abdomen, body beneath, and legs ochraceous ; tegmina dull ochraceous, opaque, much mottled with fuscous brown, two narrow transverse macular fasciæ before apical margin, the inner one much sinuate ; on costal area are two blackish spots before middle, followed by two larger angulate pale ochraceous spots before apex, a small black subapical spot, the claval area distinctly paler ; wings pale fuliginous, subhyaline, the veins darker ; pronotum with a central longitudinal carination ; mesonotum with a central longitudinal carination, on each side of this a roundly oblique longitudinal carinate line outwardly connected with the anterior margin by a short almost straight carination ; face obscurely centrally and submarginally carinate.

Long., excl. tegm., 5 mm.; exp. tegm. 17 mm.

So far as my knowledge extends *Ricania lurida*, Walk., is the nearest allied species.

### Genus Euricania.

*Euricania*, Melich. Ann. Hofmus. Wien, xiii. p. 258 (1898).

Type, *E. ocellus*, Walk.

#### *Euricania gloriosa*, sp. n.

Head, pronotum, and mesonotum black; abdomen, body beneath, and legs ochraceous; face mostly or entirely black, and distinct sternal black spots; tegmina bright shining golden-yellow, costal, apical, and inner margins, a short fascia commencing from costa at about one-third from apex and extending to near middle, followed by a discal rounded spot, black; wings pale shining golden yellow, the posterior and apical margins black; vertex, pro- and mesonota with a continuous, central, longitudinal ridge, on pronotum on each side of the ridge is a small rounded foveation, on mesonotum on each side of the central ridge there is also a waved oblique ridge and a shorter and straighter ridge connecting the latter from about middle with the anterior margin; face with three longitudinal ridges, one central, the others submarginal; clypeus distinctly centrally ridged.

Long., excl. tegm., ♂ ♀ 7–8 mm.; exp. tegm. 22–26 mm.

Allied to *E. splendida*, Fabr., from New Guinea and some of the neighbouring islands.

### Genus Armacia.

*Armacia*, Stål, Rio Jan. Hem. ii. p. 70 (1862).

#### *Armacia atrofascialis*, sp. n.

Head with the vertex piceous, face and clypeus shining, jet-black; pronotum stramineous; mesonotum stramineous, the lateral and anterior margins and a central longitudinal fascia castaneous; abdomen black, the base and some transverse lateral spots stramineous; body beneath black, sternal spots stramineous; legs stramineous, posterior femora (excluding apices) and all the tarsi black; tegmina hyaline, the venation pitchy brown, costal membrane pitchy brown, with a distinct black stigmatal spot at its apex, preceded and followed by stramineous margins; at apex of tegmen a prominent black spot and a series of small black spots on the

apical margin at the apices of the veins, on the basal area the transverse veins are distinctly infuscated; wings hyaline, the venation pitchy brown; anterior angles of vertex in front of eyes distinctly, shortly, angularly produced; pronotum with a central, longitudinal, carinate line; mesonotum tricarinate, the lateral carinations directed inwardly at anterior margin, and also connected with it by an outer short carinate line.

Long., excl. tegm., 5 mm.; exp. tegm. 18 mm.

Allied to *A. basigera*, Walk.

## Genus Sephena.

*Sephena*, Melich. Ann. Hofmus. Wien, xvii. p. 123 (1903).

Type, *S. spargula*, Walk.

### *Sephena punctulosa.*

—— *punctulosa*, Walk. MS.

Head, pronotum, and mesonotum pale ochraceous; vertex transversely speckled with sanguineous; pronotum with a central longitudinal line and spots on lateral areas sanguineous; mesonotum with three discal longitudinal lines and marginal spots sanguineous; abdomen, body beneath, and legs very pale ochraceous, more or less cretaceously pilose; anal segment of abdomen marked above with sanguineous; tegmina greyish white, speckled with sanguineous on basal area and clavus, with numerous small black spots arranged principally in two upper longitudinal series, two transversely oblique discal series, and two or three apical marginal series; wings cretaceous white; face distinctly, centrally, longitudinally carinate, the lateral margins sharply reflexed; mesonotum tricarinate; anterior angles of head in front of eyes subacute.

Long., excl. tegm., 5–6 mm.; exp. tegm. 17–19 mm.

This is a very variable species; in some specimens the ground-colour of the body and tegmina is pale virescent, and in the latter case the tegminal spots are castaneous rather than black.

A single specimen labelled by Walker "*punctulosa*" is in the British Museum, and bears the locality "Cer." (Ceram), but it has evidently never been described.

## Genus Clovia.

*Clovia*, Stål, Hem. Afr. iv. p. 75 (1866).

Type, *C. bigoti*, Sign.

*Clovia froggatti*, sp. n.

Above black, inner margins of head in front of eyes and inner margins of eyes more or less ochraceous; tegmina with a transverse fascia extending from near claval suture to about one-third from costal margin, and two subapical spots in oblique series, the uppermost smallest, stramineous, apical margin more or less testaceous brown; body beneath and legs ochraceous, lateral and frontal margins to face and a lateral marginal fascia on each side of sternum stramineous; sternal spots, subapical annulation to rostrum, tarsi, and apices of tibiæ black; head with a transverse impression a little in front of eyes, the margins slightly reflexed; pronotum and scutellum very closely and very finely wrinkled; tegmina densely and very finely punctate; face laterally transversely striate, its central area smooth.

Long., incl. tegm., 11–11½ mm.

Allied to *C. moresbyensis*, Dist.

## Genus Tartessus.

*Tartessus*, Stål, Öfv. Vet.-Ak. Förh. 1865, p. 156.

Type, *T. ferrugineus*, Walk.

*Tartessus solomonensis*, sp. n.

Head ochraceous, a black line above between the eyes and a transverse black line at inner margin of each eye; pronotum ochraceous, somewhat thickly reticulated with black; scutellum ochraceous, reticulated with black, the apex pale ochraceous; tegmina pale fuscous brown, the veins black, extreme costal margin ochraceous; head beneath and clypeus pale ochraceous, about basal third of face crossed by irregular transverse black lines, remaining area with two series of shorter black lines, two black spots between face and eyes; sternum and abdomen beneath ochraceous, with sternal and abdominal black, mostly transverse, spots; legs ochraceous, posterior femora longitudinally streaked above with black, posterior tibiæ with the bases of the spines black; vertex broad, but very short in front of eyes; pronotum finely and rather obscurely transversely wrinkled; scutellum about as long as pronotum.

Long. 11½ mm.

## LIV.—*Rhynchota from the Aru Islands.*

By W. L. Distant.

Mr. W. W. Froggatt has recently sent me a small collection of Rhynchota made at the Aru Islands. The British Museum is rich in specimens from these islands, collected by Dr. A. R. Wallace, and described by Walker, Stål, and some by myself. The following is a list of the species obtained through Mr. Froggatt, all of which are now in the National Collection:—

### Heteroptera.

*Catacanthus sumptuosus*, Dohrn.
*Lyramorpha diluta*, Stål.
*Mictis aruana*, sp. n.

### Homoptera.

*Platypleura canescens*, Walk.
*Sawda froggatti*, sp. n.
*Diceropyga obtecta*, Fabr.
*Bæturia exhausta*, Guer.
*Aphæna reversa*, Walk.
*Paricana curvifera*, Dist.
*Ricania caliginosa*, Walk.
—— *lurida*, Walk.
*Ricania trimacula*, Guer.
*Euricania concinna*, Stål.
*Colgar paracuta*, Walk.
*Phymoides rubromaculatus*, Dist.
*Neocromna bistriguttata*, Stål.
*Clovia subjuncta*, Walk.
*Cosmoscarta urvillei*, St. Farg.
*Tartessus* sp.

### Genus Mictis.

*Mictis*, Leach, Zool. Misc. i. p. 92 (1814).

Type, *M. profana*, Fabr.

### *Mictis aruana*, sp. n.

Head black, sparingly greyishly pilose; pronotum, scutellum, corium, and sternum thickly, shortly, greyishly pilose; membrane dark shining olivaceous; lateral margins of pronotum (not reaching apex), base of lateral margins to corium, and lateral margins of first and second abdominal segments ochraceous; three large carmine-red spots on each side of sternum, one on each segment.

♂. Antennæ black, shortly finely pilose, first joint almost as long as head and pronotum together, second shorter than first, slightly longer than third (fourth mutilated in typical specimen); rostrum not quite reaching the intermediate coxæ; pronotum subequal in length to breadth at base, the lateral margins oblique and shortly crenulate, lateral angles not prominent; membrane very distinctly cellular at base;

apical angles of corium narrowly produced; scutellum transversely wrinkled; margins of the connexivum granulose, slightly nodulose at the segmental incisures; second segment of the abdomen beneath with a large and prominent tubercle on each side; anterior and intermediate femora with a distinct spine near apex and slightly longer than the tibiæ; posterior femora long, robust, slightly curved, attenuated at base, posterior tibiæ moderately dilated, with a strong spine at inner surface before apex; membrane not quite reaching abdominal apex.

Long., ♂, 35 mm.

Allied to *M. limbativentris*, Stål, from New Guinea, but rostrum not reaching the intermediate coxæ: the species a considerably larger one; the lateral sternal fascia broken up distinctly into three segmental spots; abdominal pale lateral margin absent above, beneath only visible on the first and second segments.

## Genus Sawda.

*Sawda*, Dist. Ann. & Mag. Nat. Hist. (7) xv. p. 62 (1905).

Type, *S. mimica*, Dist.

### *Sawda froggatti*, sp. n.

Head and pronotum greenish ochraceous, the latter with a pale, narrow, longitudinal fascia, with darker margins and widened anteriorly and posteriorly; mesonotum brownish olivaceous, with two obconical black-margined spots extending about halfway from anterior margin, on each side of which is a shorter, more angulate, dark-margined spot, the dark margins not meeting apically; abdomen above castaneous, more or less finely greyishly pilose; face, sternum, and legs virescent; opercula ochraceous; abdomen beneath stramineous; tegmina and wings hyaline, the veins greenish or ochraceous; tegmina with the transverse veins at the apices of the ulnar areas infuscated, and the apices of the longitudinal veins to apical areas also infuscated, some of the veins on basal half of tegmina also distinctly marked with dark fuscous; opercula almost reaching the base of the fifth abdominal segment, well separated internally, moderately convex, lateral margins concavely sinuate, apical margins obliquely truncate, inner margins nearly straight.

Long., ♂ 35 mm.; exp. tegm. 108 mm.

Allied to *S. gestroi*, Dist., from New Guinea, but a smaller species, the opercula more obliquely truncate at their apices, &c.

## BIBLIOGRAPHICAL NOTICES.

*Canada Department of Mines, Geological Survey Branch.*

We have recently received two interesting parts of these publications: "Preliminary Memoir on the Lowes and Nordenskiöld Rivers Coal District, Yukon Territory," by D. D. Cairnes, and "New Species of Shells collected by Mr. John Macoun at Barkley Sound, Vancouver Island, British Columbia," described by William H. Dall and Paul Bartsch. The former paper, besides matter interesting to the mineralogist and miner, includes an account of the district, illustrated by several plates and two topographical and geological maps of the Tantalus Coal Area and the Braeburn-Kynacks Coal Area respectively. There are also occasional notes on fauna and flora, fossils, &c. Messrs. Dall and Bartsch's paper is illustrated by a plate representing 9 species of shells.

*Records of the Indian Museum.* (*A Journal of Indian Zoology.*) Vol. iv. no. vi. Issued March 9th, 1911. *A Revision of the Species of* Tabanus *from the Oriental Region, including Notes on Species from surrounding Countries.* By Gertrude Ricardo. Calcutta. Pp. 111–258; 2 pls. Price 2 rupees.

A very useful synopsis of the subject. 117 species are included in the present paper, divided into 11 groups, and a table is given of all the species with which Miss Ricardo is sufficiently acquainted to include them. Many supposed species have been sunk as synonyms, but 40 have been described as new. The paper is entirely systematic, and we do not notice any remarks on habits, &c., which, as many collectors are inexcusably careless about recording even localities, is perhaps not surprising.

*Catalogue of the Lepidoptera Phalænæ in the British Museum.* Vol. X., Plates cxlviii.–clxxiii. London: Printed by Order of the Trustees, 1911. Price 20*s*.

Six months after the publication of vol. x. of this epoch-making work the coloured plates illustrating it have appeared. It is easy to see that they accurately represent the moths themselves and, as usual, are drawn and lithographed by our leading entomological artist, Mr. Horace Knight, and are chromolithographed by Messrs. West and Newman. As the moths belong to the subfamily *Erastrianæ*, which is poorly represented in Britain, and even in Europe, most of the figures represent species of forms and colours unfamiliar to British entomologists; nevertheless, on pl. cxlviii., which represents moths of the subfamily *Acronyctinæ* described in vols. viii. and ix., we find a figure of a female of *Luperina guenei*, Doubl., a British species. This appears to be the only European species figured, among upwards of 800 from all other parts of the world; there are, however, a few Palæarctic species, among others, from Algeria, Egypt, Asia Minor, &c. This elaborate and well-illustrated monograph cannot but be of the greatest value to all Lepidopterists who pay any attention to exotic species.

## PROCEEDINGS OF LEARNED SOCIETIES.

### GEOLOGICAL SOCIETY.

March 8th, 1911.—Prof. W. W. Watts, Sc.D., M.Sc., F.R.S., President, in the Chair.

The following communication was read:—

'On the Teeth of the Genus *Ptychodus*, and their Distribution in the English Chalk.' By George Edward Dibley, F.G.S.

This paper is an attempt to define the species of the fossil fish genus *Ptychodus*, and gives the result of the investigations pursued by the writer during the past twenty years among the extensive Chalk quarries in the Thames and Medway Valleys, West Kent, and the adjoining parts of Surrey, with reference to the zonal distribution of the genus.

The Medway Valley affords special facilities for such investigations, as there are numerous quarries worked there, from the *Micraster cor-anguinum* zone down to the Chalk Marl. In addition to material from the above-mentioned localities, material collected from the contents of the chief provincial museums, and also the specimens in the National Collections at the British Museum (Natural History) and the Museum of Practical Geology, Jermyn Street, have been studied in detail by the Author, who has obtained no less than fifty associated sets of teeth from various localities.

Hitherto, our information as regards *Ptychodus* has been derived from associated sets of *Pt. decurrens* in place and isolated teeth of this and other species. The variation in teeth of one individual is often so marked, that when found separately they have given rise to the formation of new species. From evidence now brought together by the Author for the first time, it can be proved that these teeth belong to already-known species, and merely represent a phase in variation in the development of certain teeth of one species.

Special attention has been given to the extreme variation in *Pt. decurrens*, as well as in the equally variable species *Pt. polygyrus*, and one new species has been added.

A special feature is, that throughout the species, a series of teeth extending from the centre to the exterior of the palate is figured, which also for the first time enables the student to form some idea of the variation exhibited by the separate rows, even in the teeth of the same individual, and indicates the care necessary in identifying species when dealing with solitary teeth.

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Kirby's Supplement to Diurnal Lepidoptera. 1871–1877. 8*s.* 6*d.* net. Lepidoptera Heterocera.—Sphinges & Bombyces. 1892. £2 2*s.* net. Neuroptera Odonata. 1890. 16*s.* net.
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## LV.—*Descriptions of new Genera and Species of* Syntomidæ, Arctiadæ, Agaristidæ, *and* Noctuidæ. By Sir George F. Hampson, Bart., F.Z.S.

The following paper forms a sixth supplement to the first ten volumes of the 'Catalogue of Lepidoptera Phalænæ in the British Museum,' the former papers having appeared in the Ann. & Mag. Nat. Hist. ser. 7, vol. viii. pp. 165–186 (1901), vol. xi. pp. 337–351 (1903), vol. xv. pp. 425–453 (1905), vol. xix. pp. 221–257 (1907), and ser. 8, vol. iv. pp. 344–388 (1909).

The numbers before the species indicate their position in the classification adopted in those volumes. The types are in the British Museum.

### Syntomidæ.

81 *a*. *Syntomis leucozona*, sp. n.

♀. Head, thorax, and abdomen black-brown with a slight bluish gloss; frons white; shoulders and pectus with white spots; abdomen with subdorsal white spots on first segment, lateral spots on second segment, and dorsal band on fourth segment. Fore wing black-brown with a faint bluish gloss; a triangular semihyaline white spot below middle of cell and postmedial spots below veins 7, 5, 4. Hind wing black-brown with a faint bluish gloss; a round semihyaline white

spot below the cell and postmedial spots below veins 5 and 3, the latter small.

*Hab.* Borneo, Limbang (*Moulton*), 1 ♀ type. *Exp.* 46 mm.

195 *a*. *Syntomis tritonia*, sp. n.

♀. Head and thorax black shot with metallic green; the antennæ white towards tips; frons and tegulæ with white points at side, the shoulders with white spots; coxæ with white spots, the femora and tibiæ streaked with white, the tarsi with the basal joints white; abdomen black suffused with metallic green, the basal segment with subdorsal white spots and lateral orange spots, the four following segments with subdorsal orange bands and ventral spots. Fore wing black suffused with brilliant metallic green; an elliptical hyaline antemedial spot below the cell, quadrate spot in end of cell, oblique spot below vein 2, and elongate postmedial spots above veins 6, 4, 3. Hind wing black shot with brilliant metallic green; a hyaline patch on basal inner area, spot in end of cell, and postmedial spots above and below vein 3.

*Hab.* S. Nigeria, Ilesha (*Humphrey*), 1 ♀ type. *Exp.* 50 mm.

297. *Balacra furva*, sp. n.

*Pseudapiconoma rubricincta*, Hmpsn. Cat. Lep. Phal. B. M. i. p. 151 (part.).

♂. Head and thorax white, the palpi, frons, and edges of tegulæ crimson, the patagia with crimson stripes, the pro-, meso-, and metathorax with paired dorsal bars; antennæ black below; pectus and femora crimson, the tibiæ and tarsi white; abdomen crimson with white and fuscous segmental lines, the anal tuft white at tip, the ventral surface white with crimson bands. Fore wing with the basal half, inner area, and costal area buff, the last extending beyond the cell down to vein 6 and with a white stripe on costa to beyond middle and antemedial spot on vein 1; the rest of wing hyaline, with the veins buff; a hyaline spot in end of cell before the buff discoidal patch conjoined to the buff on costal area. Hind wing small, with the tornus lobed; crimson, the cilia white.

*Hab.* Gold Coast (*W. H. Johnston*), 1 ♂ type, Ashanti (*McCarthy*), 1 ♂. *Exp.* 40 mm.

300 *a*. *Melisa atavistis*, sp. n.

Fore wing of male with veins 2, 3, 4 not bent downwards; hind wing rather larger and less distorted, the costal area with fold towards apex only.

♂. Head and thorax black-brown shot with some metallic blue; legs scarlet, the tibiæ with some blue-black at base and orange on inner side, the tarsi orange; abdomen black-brown with silvery-blue segmental lines on terminal segments, subdorsal series of ochreous spots, the anal tuft crimson, the ventral surface with the basal half scarlet, the terminal half ochreous. Fore wing black-brown suffused with metallic blue. Hind wing black-brown. Underside of fore wing with grey-brown streak above vein 5.

*Hab.* Gold Coast, Bibianaha (*Spurrell*), 3 ♂ type. *Exp.* 48 mm.

417 *a*. *Eunomia caymanensis*, sp. n.

♀. Head and thorax black; palpi white in front and behind; frons edged with white except above at middle; gulæ and a point on vertex of head white; tegulæ and patagia edged with white, the dorsum of thorax with white streak and the meso- and metathorax edged with white behind; pectus, fore coxæ at sides, and the femora above except at extremities crimson, the coxæ white in front, the legs streaked with white; abdomen black with subdorsal series of white and crimson bars, the terminal segments with dorsal white segmental lines, the anal segment with white patch, lateral crimson stripes, the ventral surface crimson at base, then with crimson bands. Fore wing hyaline, the veins and margins black slightly irrorated with white; an oblique white striga below base of cell and streak on base of vein 1; a black discoidal bar conjoined to the black on costa; the terminal band expanding widely on apical area and below vein 2, its inner edge angled inwards at discal fold. Hind wing hyaline, the veins and margins black slightly irrorated with white, the inner area black to submedian fold, the black on termen expanding widely on apical area.

*Hab.* Grand Cayman, Georgetown (*Savage-English*), 1 ♀ type. *Exp.* 32 mm.

805 *a*. *Diptilon flavipalpis*, sp. n,

♂. Head and thorax black; palpi orange, the third joint

black; frons ochreous white; gulæ orange-red; vertex of head with ochreous streaks conjoined behind; tegulæ, patagia, and dorsum of thorax with brownish streaks; legs streaked with yellow and black, the hind tibiæ and tarsi orange; abdomen black with some yellow and brown hairs, the first three segments with dorsal yellow patches and their ventral surface ochreous white. Fore wing hyaline, the veins and margins narrowly black. Hind wing black with the fold and tuft white.

*Hab.* Argentina, La Rioja (*Giacomelli*), 1 ♂ type. *Exp.* 24 mm.

P. 451. For *Trichodesma*, Hmpsn. 1898, nec Leconte, Col. 1861, read Desmotricha, n. n.

1062 *a*. *Delphyre pyroperas*, sp. n.

Head and thorax pale red-brown, the back of head and shoulders with paired crimson spots; palpi at base and coxæ pale crimson; abdomen black-brown, the four terminal segments crimson with slight dark segmental lines and the anal tuft blackish, the ventral surface crimson. Fore wing pale red-brown, the veins, discal and submedian fold slightly darker; a faint diffused discoidal patch, the apical area with faint diffused patch. Hind wing black-brown with hyaline streaks in, below, and just beyond the cell and on basal inner area.

*Hab.* Brazil, Rio Grande do Sul, 1 ♀; Paraguay, Sapucay (*Foster*), 1 ♂ type. *Exp.* 42 mm.

1091 *c*. *Eucereon pyrozona*, sp. n.

♂. Head and thorax black-brown mixed with yellowish, the back of head and shoulders with paired pale crimson spots, the metathorax with yellowish-white patch; coxæ crimson; abdomen black, with orange-scarlet subdorsal spots on fifth segment and dorsal band on sixth to eighth segment. Fore wing black-brown, with olive-yellowish streaks on the veins and in discal and submedian folds; a curved olive subbasal line from costa to submedian fold; antemedial line slightly angled outwards below costa, then oblique to vein 1 and bent inwards to inner margin; a round dark spot at middle of cell defined on inner side by olive and on outer by a rather quadrate whitish patch; an olive discoidal striga; a sinuous olive line beyond the cell between veins 7 and 3; postmedial line pale olive, oblique from costa to vein 4 at

subterminal line, then bent inwards to vein 2 below end of cell and erect to inner margin; subterminal line pale olive, oblique to vein 5, then bent inwards to the angle of postmedial line at vein 3, where it terminates in an ochreous terminal patch between veins 4 and 2 with two short black streaks on it. Hind wing black-brown with the interspaces hyaline in, below, and just beyond the cell.

*Hab.* Venezuela, Caura Valley (*Klages*), 5 ♂ type; Br. Guiana (*Rodway*), 1 ♂. *Exp.* 42–46 mm.

## Arctiadæ.

### *Nolinæ.*

*7 a. Celama ochrolopha,* sp. n.

♀. Head and thorax white; palpi fuscous towards base; antennæ fuscous towards tips; pectus and legs suffused with fuscous, the tarsi ringed with white; abdomen whitish with diffused fuscous bands. Fore wing white, the inner and terminal areas tinged with brown; a small black spot at base of costa, the costal edge black to the antemedial line with a slight subbasal striga from it; antemedial line black, curved, expanding into a small spot at costa; tufts of ochreous scales at middle of cell and on discocellulars, slightly defined by blackish; postmedial line black, angled outwards below costa, then with a diffused black band before it forming slight streaks at the veins and angled inwards at vein 2, the line incurved below vein 4; subterminal line black, angled outwards at vein 6 and excurved at middle, angled inwards at discal fold and vein 2. Hind wing white tinged with brown, the underside with diffused dark discoidal spot.

*Hab.* Sikhim (*Möller*), 1 ♀ type. *Exp.* 18 mm.

61 *a. Nola fovifera,* sp. n.

Fore wing of male with triangular fovea in upper extremity of cell.

Head and thorax grey-white mixed with fuscous; palpi black at sides, whitish above; antennæ blackish; legs black, the tarsi ringed with white; abdomen grey-white with obscure dorsal brownish bands. Fore wing pale grey irrorated with black; a blackish mark on costa near base; antemedial line black, slightly angled outwards below costa, then oblique and minutely waved, bent outwards above inner margin, a black patch beyond it on costa; postmedial line

represented by a series of black points on the veins, excurved below costa and between veins 5 and 3, then incurved; a diffused subterminal line with dark streaks on the veins, excurved below costa and at middle; a terminal series of black points; cilia with fuscous spots near base and fine line near tips. Hind wing whitish tinged with brown; the underside with the costal area irrorated with black, a fuscous discoidal bar.

*Hab.* Gold Coast, Kumasi (*Whiteside*), 1 ♀; N.E. Rhodesia, Fort Jameson (*Neave*), 1 ♂ type. *Exp.* 20 mm.

61 *c. Nola perfusca*, sp. n.

♂. Head, thorax, and abdomen fuscous brown mixed with some grey. Fore wing fuscous brown mixed with grey and irrorated with black; traces of an oblique sinuous antemedial line; a blackish spot in middle of cell; faint traces of sinuous postmedial and subterminal lines. Hind wing fuscous brown slightly irrorated with grey.

♀. Greyer, especially the head, thorax, and fore wing, the last without the blackish spot in cell.

*Hab.* S. Nigeria, Lagos (*Lamborn*), 1 ♂, 1 ♀ type. *Exp.*, ♂ 16, ♀ 18 mm.

*Cocoon* brown, formed several together on a leaf.

66 *c. Nola chionea*, sp. n.

♂. Head and thorax white; palpi and antennæ except towards base ochreous mixed with blackish; pectus and legs suffused with ochreous brown, the fore legs blackish, the tarsi ringed with white; abdomen white suffused with ochreous brown. Fore wing white, the terminal area suffused with ochreous brown except at apex; an ochreous-brown patch at base of costa, a medial patch from costa to median nervure and another from vein 2 to inner margin with some silvery scales on them; a postmedial series of points on the veins, incurved below vein 4 and below vein 2 to the inner medial patch; an indistinct white subterminal line excurved below vein 7 and at middle; some brownish spots on costa towards apex and a series at extremities of the veins; cilia ochreous mixed with brown. Hind wing white, the cilia tinged with ochreous brown except towards tornus; the underside with the costal area thickly irrorated with brown, a dark discoidal spot.

*Hab.* S. Nigeria, Ilesha (*Humphrey*), 1 ♂ type. *Exp.* 18 mm.

90 *a*. *Nola diagona*, sp. n.

♀. Head and thorax white slightly irrorated with brown; palpi with brown spot on second joint in front; pectus and legs suffused with brown, the tarsi ringed with white; abdomen ochreous white, the ventral surface suffused with brown. Fore wing white irrorated with fuscous especially on outer half of medial area; a small subbasal dark spot on costa; antemedial line blackish with small spot on costa, oblique and sinuous to submedian fold, then inwardly oblique; a dark spot on costa above end of cell and oblique sinuous line from lower angle to inner margin; postmedial line blackish, oblique to vein 5, then inwardly oblique and slightly bent outwards to inner margin; subterminal line indistinct, dark, angled outwards below vein 7, excurved and with dark patch before it at middle, then oblique; a slight maculate line before termen, bent inwards to costa, and a terminal series of dark striæ. Hind wing white, the termen tinged with brown except towards tornus; the underside with the costal area irrorated with brown and a discoidal striga.

*Hab.* Dutch N. Guinea, Fak-fak (*Pratt*), 1 ♀ type. *Exp.* 22 mm.

115 *a*. *Rœselia xanthoplaga*, sp. n.

♀. Head and tegulæ white, the thorax white tinged with ochreous; palpi, antennæ, pectus, legs, and abdomen white tinged with brown, the tarsi fuscous ringed with white. Fore wing white suffused with pale red-brown, some yellow suffusion on basal area, the inner medial area yellow tinged with rufous and irrorated with large black scales, and with slight black streaks on vein 2 and in submedian fold; antemedial line rather ill-defined, double, brownish filled in with white, excurved, a blackish spot on it at costa and an oblique blackish bar beyond it from costa with an oblique whitish shade from before it to lower angle of cell; postmedial line absent; the apical part of costa suffused with blackish, with some white points on costa; subterminal line indistinct, white, obliquely excurved below costa, excurved to termen at middle, a white patch at tornus with an elliptical red-brown patch on it and a dark line on its inner edge; cilia white mixed with brown on apical half and with some dark points above tornus. Hind wing white, the apex faintly tinged with brown. Underside of fore wing white suffused with fuscous brown except on inner area.

*Hab.* Sikhim (*Möller*), 1 ♀ type. *Exp.* 26 mm.

124 *a*. *Rœselia hemizona*, sp. n.

♂. Head and thorax ochreous white, the latter suffused with red-brown; palpi dark brown; antennæ red-brown; legs suffused with red-brown, the tarsi dark brown with pale rings; abdomen white, slightly tinged with red-brown. Fore wing ochreous white, the costal area to beyond middle and the terminal area suffused with red-brown; an oblique red-brown bar from middle of costa to just below end of cell, defined at sides by white and with a few silvery scales on it; postmedial line very indistinct, oblique from the red-brown costal area to vein 4, then incurved; traces of a punctiform subterminal line, angled inwards at vein 2; the veins of terminal area with slight dark streaks on apical half. Hind wing white, the termen and cilia faintly tinged with red-brown except towards tornus; the underside with the costal area faintly tinged with ochreous.

*Hab.* Dutch N. Guinea, Fak-fak (*Pratt*), 1 ♂ type. *Exp.* 20 mm.

151 *a*. *Rœselia atrinota*, sp. n.

Hind wing with veins 3, 4 from cell.

♂. Head and thorax silvery white with a few blackish scales; palpi blackish; antennæ brown; the tegulæ with diffused blackish medial band; tibiæ and tarsi banded with brown; abdomen white suffused with ochreous brown. Fore wing silvery white irrorated with a few black scales, the apical area blackish to vein 3, with some silvery scales on it and a whitish patch on costa at apex; some brown suffusion on costa near base with a white subbasal striga on it; medial line indistinct, double, blackish, with some blackish suffusion on it at costa, oblique and slightly sinuous to submedian fold, then bent inwards to inner margin where there is a conical blackish patch on it; traces of an oblique black postmedial line before the dark apical area from costa to vein 4 and a black point in submedian fold, some whitish points beyond it on costa; traces of some black and whitish subterminal points on the dark apical area; a slight punctiform black terminal line; cilia blackish on apical half, whitish mixed with brown on inner half, and with slight dark line through them. Hind wing white tinged with brown, the terminal area suffused with brown except towards tornus; cilia with a dark line through them; the underside with oblique dark discoidal striga.

*Hab.* Dutch N. Guinea, Fak-fak (*Pratt*), 1 ♂ type. *Exp.* 22 mm.

*Lithosianæ.*

215 *a. Nishada brunneipennis*, sp. n.

♂. Head and tegulæ orange-yellow ; palpi brown at tips; antennæ brown ; tegulæ with brown patches ; thorax dark brown, with some orange-yellow at base of patagia and a patch on metathorax ; pectus and legs yellow, the latter brown above; abdomen dark brown, the ventral surface yellow. Fore wing brown with a yellow spot at base of costa. Hind wing brown, the costal area whitish. Underside of fore wing with the basal half whitish except the costal area.

♀. Hind wing uniform pale brown ; the underside of both wings wholly brown.

*Hab.* Moluccas, Batian (*Doherty*), 3 ♂, 1 ♀ type. *Exp.*, ♂ 22–24, ♀ 26 mm.

304 *b. Ilema mesosticta*, sp. n.

Fore wing with vein 6 from below angle of cell ; 11 anastomosing with 12.

♀. Head and thorax ochreous brown ; abdomen ochreous brown dorsally tinged with fuscous. Fore wing ochreous brown ; a black spot in upper extremity of cell with another below it in submedian fold. Hind wing pale ochreous brown with the terminal area to vein 2 darker ; the underside pale brownish grey, the costal area and terminal area to vein 2 more ochreous brown.

*Hab.* S. Nigeria, Ilesha (*Humphrey*), 1 ♀ type. *Exp.* 26 mm.

344 *a. Ilema cretacea*, sp. n.

♂. Head and thorax chalky white slightly tinged with yellowish ; pectus yellowish ; palpi and legs tinged with fuscous ; abdomen yellowish with some whitish at base. Fore wing chalky white irrorated with a few brownish scales, the costal edge fulvous yellow. Hind wing chalky white, the inner margin and terminal area yellow. Underside of both wings yellow, the fore wing tinged with brown except on costal and inner areas.

*Hab.* Sikhim (*Möller*), 1 ♂ type. *Exp.* 28 mm.

379 *a. Chrysorabdia vilemani*, sp. n.

*Chrysorabdia taiwana*, Wileman, Entom. 1910, p. 178, ♀ (nec ♂).

♀. Head, thorax, and abdomen yellow ; palpi at tips, sides of frons, and antennæ black ; tegulæ metallic green

over black with yellow outer edge; femora towards extremities, tibiæ and tarsi green over black. Fore wing yellow; a broad black costal fascia suffused with metallic green and of nearly even width throughout; a similar oblique fascia from above inner margin near base to below vein 5 near termen, pointed towards base; cilia blackish on apical half. Hind wing yellow.

*Hab.* Formosa, Rantaizan (*Wileman*), type † ♀ in Coll. Wileman. *Exp.* 54 mm.

### Genus Heliorabdia, nov.

Type, *Chrysorabdia taiwana*, Wileman.

Proboscis fully developed; palpi porrect, hardly extending beyond the frons which is smooth; eyes large, round; antennæ of male ciliated; tibiæ with the spurs moderate. Fore wing long and narrow; vein 2 from middle of cell; 3 from near angle; 4, 5 from angle; 9 from 10 anastomosing with 8 to form the areole, 7 from the areole; 11 from cell. Hind wing with veins 3 and 5 from angle of cell, 4 absent; 6, 7 coincident; 8 from middle of cell.

421 *a*. *Agylla endoloba*, sp. n.

Fore wing with the inner margin strongly curved and forming a lobe.

♂. Head and thorax white suffused with fuscous; antennæ tinged with fulvous; abdomen white slightly tinged with fuscous; pectus, legs, and ventral surface of abdomen ochreous white, the fore legs brownish. Fore wing white, the inner half suffused with greyish fuscous, the costal edge tinged with fulvous yellow. Hind wing white. Underside of fore wing yellowish white, with a large diffused brownish patch on tornal area.

*Hab.* W. Colombia, Rio Dagua, Naranjito, 1 ♂ type. *Exp.* 34 mm.

431 *a*. *Agylla steniptera*, sp. n.

♂. Head and thorax fuscous; palpi at base, antennæ, vertex of head, tegulæ except at tips and patagia ochreous; pectus, legs, and abdomen ochreous, the fore tibiæ and tarsi fuscous. Fore wing narrow, silvery white, a broad fuscous fascia on inner margin with some ochreous suffusion above it; the costal edge ochreous, fuscous at base. Hind wing ochreous white, with some fuscous suffusion on termen from apex to vein 4. Underside of fore wing ochreous

white, the terminal area fuscous extending as a wedge-shaped patch in cell nearly to base.

*Hab.* W. Colombia, R. Dagua, Naranjito, 1 ♂ type. *Exp.* 30 mm.

545 *b. Garudinodes trizona*, sp. n.

Fore wing with vein 6 stalked with 7, 8, and 10.

♀. Head white, the palpi and antennæ red-brown; thorax and abdomen red-brown, the patagia with a few white scales at tips, the tibiæ and tarsi with white bands, the anal tuft whitish at extremity. Fore wing white; a broad oblique chocolate-brown antemedial band, its outer edge excurved at middle; an oblique medial chocolate-brown band expanding somewhat to costa and inner margin; a broad terminal chocolate-brown band leaving a small white patch at apex, its inner edge obliquely curved and slightly angled inwards below costa and at middle; cilia white except at base towards tornus. Hind wing pale chocolate-brown.

*Hab.* Dutch N. Guinea, Ron I. (*Doherty*), 1 ♀ type. *Exp.* 20 mm.

560 *d. Macaduma castanea*, sp. n.

♂. Head, thorax, and abdomen chestnut-brown; pectus, ventral surface of abdomen, and anal tuft yellow. Fore wing chestnut-brown, the terminal half slightly tinged with grey and with a faint diffused curved chestnut postmedial band. Hind wing yellow, the terminal area tinged with red-brown, narrowing to tornus. Underside of fore wing with the truncate apical part of costa yellow.

*Hab.* Dutch N. Guinea, Fak-fak (*Pratt*), 1 ♂ type. *Exp.* 28 mm.

696 *a. Eurosia puncticosta*, sp. n.

Antennæ of male ciliated; hind wing with veins 3, 4 shortly stalked, the costa strongly lobed and the apex truncate.

♂. Head, thorax, and abdomen red-brown, the last dorsally tinged with fuscous. Fore wing red-brown; the costal edge blackish towards base; a black-brown point at middle of costa and postmedial striga from costa. Hind wing rather paler red-brown.

*Hab.* Batian (*Doherty*), 1 ♂ type. *Exp.* 12 mm.

798 *a. Nodozana pyrophora*, sp. n.

Fore wing of male on underside with fringe of hair below

middle of costa, a patch of androconia in middle of cell and another patch on discocellulars, some silky scaling below end of cell with hairy scaling before and beyond it, the neuration rather distorted; hind wing with vein 5 from lower angle of cell.

♂. Head, thorax, and abdomen creamy white; palpi, antennæ, pectus, legs, and ventral surface of abdomen slightly tinged with brown. Fore wing creamy white; a small black discoidal spot; a large patch of fiery orange-red below and beyond the cell from before middle to near termen, extending slightly into the middle of cell and interrupted by a creamy-white bar from lower angle of cell to vein 1, then bent outwards to tornus, the outer edge of the patch obliquely curved from below costa beyond the cell. Hind wing creamy white. Underside of fore wing creamy white, with the fringe of hair below costa and the patches of androconia fuscous brown.

*Hab.* Bolivia, Yungas la Paz (*Seebold*), 2 ♂ type. *Exp.* 18 mm.

830 *a*. *Siccia melanospila*, sp. n.

Head, thorax, and abdomen grey tinged with pale red-brown; palpi black; fore legs and mid tibiæ and tarsi blackish. Fore wing brownish grey; small obliquely placed subbasal black spots on costa and below the cell; antemedial black spots on costa and below the cell; medial black spots on costa, in cell, and on inner margin, and a discoidal spot; traces of a punctiform postmedial line with black spots on costa, in discoidal and submedian folds and on inner margin, the line oblique from costa to discal fold, then inwardly oblique to submedian fold and bent outwards to inner margin; a spot on costa towards apex; some points on apical part of costa and spots at discal and submedian folds. Hind wing whitish suffused with brown; the underside with the costal area browner, a brown discoidal spot.

*Hab.* Br. E. Africa, Kikuyu, Escarpment (*Doherty*), 3 ♂, 1 ♀ type. *Exp.* 24 mm.

Genus Phacusosia, nov.

Type, *P. xanthosoma*.

Proboscis fully developed; palpi porrect, not extending beyond the frons, which is rounded; antennæ of female ciliated; hind tibiæ with two pairs of spurs. Fore wing long and narrow, the apex rounded, the termen obliquely curved; veins 3, 4 from angle of cell; 5 from well above

angle; 6, 7, 8 stalked; 9 absent; 10, 11 from cell. Hind wing with vein 2 from near angle of cell; 3, 4 on a long stalk; 5 from just below middle of discocellulars; 6, 7 on a long stalk; 8 from middle of cell.

894 *c*. *Phacusosia xanthosoma*, sp. n.

♀. Head and thorax dark brown; shoulders with orange bar; metathorax with orange patch; coxæ yellow; abdomen orange, with lateral brown patches at base and the extremity dark brown. Fore wing dark brown; a small yellow spot at base of cell; a wedge-shaped hyaline patch in cell and elongate patch below it bisected by the dark submedian fold; a blackish discoidal patch; hyaline streaks beyond the cell between veins 10 and 2, the streak above vein 2 slight. Hind wing black-brown; the costal area whitish to near apex; a hyaline streak below the cell.

*Hab.* Br. N. Guiana, Babooni (*Pratt*), 1 ♀ type. *Exp.* 36 mm.

896 *a*. *Tricholepis melanoxantha*, sp. n.

♂. Head and thorax orange; palpi and antennæ black; pectus and legs black-brown, the former with some orange in front and at sides; abdomen black-brown, the ventral surface orange except at extremity. Fore wing with the basal half orange, its outer edge straight and erect; a slight subbasal black streak on costa: the terminal half black-brown. Hind wing black, with the costal area to near apex and the cell orange.

*Hab.* Moluccas, Batian (*Doherty*), 1 ♂ type. *Exp.* 16 mm.

930 *a*. *Asura anæmica*, sp. n.

♂. Head and thorax pale yellow mixed with pale red-brown; abdomen yellowish white. Fore wing very pale red-brown; some pale yellowish at base of inner margin; slight antemedial yellowish marks on costa and below the cell; an irregular yellowish patch on inner medial area and an irregular mark beyond and below lower angle of cell; traces of some small subterminal yellowish spots and of slight spots on termen above and below vein 2. Hind wing yellowish white, the apex faintly tinged with brown.

*Hab.* Dutch N. Guinea, Fak-fak (*Pratt*), 2 ♂ type. *Exp.* 20–26 mm.

1009 *a*. *Miltochrista phœodonta*, sp. n.

Head and thorax pale ochreous yellow ; vertex of head and shoulders with black points ; fore tibiæ with fuscous band at extremities ; abdomen ochreous white, fuscous towards extremity and on ventral surface. Fore wing ochreous ; fuscous streak on basal area below costa and cell and above and below vein 1, short towards inner margin ; the costal edge black to the strongly excurved antemedial black line which does not quite reach inner margin ; a slightly curved medial black line, approximated to the antemedial line below costa ; postmedial line blackish, rather diffused, bent outwards below costa, then oblique and very highly dentate to above inner margin, some short black streaks beyond it below costa and a subterminal series of small blackish spots. Hind wing pale ochreous ; a diffused pale fuscous postmedial line from costa to vein 2, slightly excurved below costa, then oblique ; a faint fuscous subapical spot and subterminal bar towards tornus. Underside of fore wing with the basal half of costal area fuscous, a broad fuscous postmedial band except on inner area with slight streaks beyond it on the veins.

*Hab.* Sikhim (*Möller*), 2 ♂, 1 ♀ type. *Exp.* 22 mm.

1153 *a*. *Diduga plumosa*, sp. n.

♂. Head, thorax, and abdomen greyish suffused with brown ; palpi and fore legs blackish. Fore wing greyish suffused with red-brown ; an oblique antemedial brown line with small spot at costa, slightly incurved below submedian fold and with some brown suffusion beyond it in cell ; a faint elliptical brown annulus just beyond the cell ; postmedial line with dark spot at costa, very strongly bent outwards below costa, then waved, bent inwards at vein 3, a maculate brown band beyond it and some dark points on costa ; a terminal series of dark points. Hind wing greyish suffused with brown.

*Hab.* Tambora (*Doherty*), 1 ♂ type. *Exp.* 16 mm.

1162 *a*. *Eugoa sexpuncta*, sp. n.

♂. Head and thorax yellow tinged with brown ; sides of palpi and frons black ; abdomen yellow. Fore wing yellowish slightly irrorated with brown, the terminal area slightly suffused with brown ; small obliquely placed subbasal and antemedial black spots below costa and in submedian fold, a spot above base of vein 2 and a discoidal spot ;

an oblique brown shade from postmedial part of costa to discal fold beyond the cell and an incurved shade on inner area with blackish spots on it, above and below vein 1; an obscure rather diffused dark subterminal line arising from apex, angled outwards at vein 7, excurved at middle and above tornus and angled inwards at discal fold and at vein 2. Hind wing yellow, the apex slightly tinged with brown.

*Hab.* Dutch N. Guinea, Fak-fak (*Pratt*) 1 ♂ type. *Exp.* 24 mm.

### *Arctianæ.*

### Genus Hæmaphlebia, nov.

Type, *Baritius venata*, Roths.

Proboscis fully developed; palpi upturned, the second joint reaching to middle of frons, the third short; frons smooth; antennæ of male bipectinate with moderate branches, the apex serrate; hind tibiæ with two pairs of spurs; abdomen with some rough hair at base. Fore wing with the apex rounded, the termen evenly curved and not crenulate; vein 3 from before angle of cell; 5 from above angle; 6 from upper angle; 7, 8, 9, 10 stalked, 7 from just beyond 10; 11 from cell. Hind wing with veins 3 and 5 stalked, 4 absent; 6, 7 shortly stalked; 8 from middle of cell.

### Genus Pydnaodes, nov.

Type, *Tessellarctia distincta*, Roths.

Proboscis fully developed; palpi upturned, the second joint reaching to middle of frons and broadly scaled, the third short; frons smooth; eyes large, round; antennæ of male bipectinate with moderate branches to apex; fore tibiæ fringed with hair, the hind tibiæ with two pairs of spurs; abdomen with some rough hair at base of dorsum. Fore wing with the apex somewhat produced and acute, the termen evenly curved; vein 3 from before angle of cell; 5 from just above angle; 6 from below upper angle; 7, 8, 9, 10 stalked; 11 from cell. Hind wing with vein 3 from angle of cell; 4, 5 shortly stalked; 6, 7 from upper angle; 8 reduced to a spur from middle of cell.

### Genus Nannodota, nov.

Type, *Halisidota minuta*, Roths.

Proboscis fully developed; palpi upturned, reaching to

about middle of frons; antennæ of male bipectinate with moderate branches; fore tibiæ fringed with long hair; hind tibiæ with two pairs of spurs. Fore wing long and narrow, the apex rather produced and acute, the termen obliquely curved; vein 3 from angle of cell; 4, 5 strongly stalked; 6 from upper angle; 7, 8, 9, 10 stalked; 11 from cell. Hind wing with veins 3, 4, 5 stalked; 6, 7 stalked; 8 absent.

### Genus Chlorocrisia, nov.

Type, *Diacrisia irrorata*, Roths.

Proboscis aborted, minute; palpi porrect, short, fringed with long hair below; a long flattened downcurved corneous spine from between antennæ, pointed at extremity; eyes large, round; antennæ of male bipectinate with moderate branches to apex; thorax clothed with long hair; tibiæ fringed with long hair, the hind tibiæ with two pairs of spurs; abdomen dorsally clothed with long hair towards base. Fore wing with the apex rounded, the termen evenly curved; vein 3 from near angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9 stalked; 10, 11 from cell. Hind wing with veins 3 and 5 from near angle of cell; 6, 7 from upper angle; 8 from middle of cell.

### Genus Graphelysia, nov.

Type, *Elysius strigillata*, Roths.

Proboscis rather slight; palpi porrect, extending as far as the large, pointed, conical frontal prominence; eyes large, round, smooth; antennæ of male bipectinate with moderate branches to apex; thorax clothed with long hair only; tibiæ moderately fringed with hair, the hind tibiæ with terminal pair of spurs only; abdomen with some rough hair at base of dorsum. Fore wing rather narrow, the apex rounded, the termen obliquely curved; vein 3 from well before angle of cell; 5 from above angle; 6 from below upper angle; 7, 8, 9, 10 stalked, 10 from far beyond 7; 11 from cell. Hind wing with veins 3, 4 from angle of cell; 5 from above angle; 6, 7 shortly stalked; 8 from near middle of cell.

1742 *b*. *Diacrisia neurica*, n. n.

*Mœnas venosa*, Hmpsn. Cat. Lep. Phal. B. M. iii. p. 251 (nec Moore).

1813 *b*. *Diacrisia nyasica*, sp. n.

♂. Head orange-yellow; thorax creamy white, the tegulæ edged with yellow, the patagia and shoulders with black spots; palpi above and antennæ black; pectus and legs orange-yellow, the fore coxæ with black spots, the fore femora streaked with black, the fore and mid tibiæ black above with yellow ring at extremity, the tarsi black, the hind tarsi black ringed with yellow; abdomen orange-yellow, with dorsal and lateral series of black spots except at base and extremity. Fore wing creamy white; a small black spot at base; an antemedial series of five black spots bent outwards at median nervure; a small discoidal spot and spot above it on costa; a small spot above base of vein 6 and incurved series of four spots between vein 3 and inner margin. Hind wing orange-yellow; a black discoidal point. Underside of fore wing orange-yellow with black discoidal point.

Ab. 1. Fore wing with the antemedial black spot in cell and the postmedial spots above veins 6 and 2 absent.

*Hab.* Br. Centr. Africa, Zomba (*Neave*), 2 ♂ type. *Exp.* 38 mm.

1833 *b*. *Amsacta flavizonata*, sp. n.

♀. Head and thorax white, the palpi, back of head, and tips of tegulæ yellow; antennæ with the branches black, some yellow between their bases; femora yellow above, the fore femora, fore and mid tibiæ, and the tarsi on inner side streaked with black; abdomen white, the medial segments dorsally yellow, lateral series of black points. Fore wing white, the costal edge yellow; antemedial black points on costa and above vein 1 and on one side below median nervure; a black point at upper angle of cell and two minute points at lower angle; a postmedial series of points, incurved below vein 3; a subterminal series of points from costa to vein 3, placed in pairs on each side of the veins; a series of points just before termen. Hind wing semihyaline white.

*Hab.* S. Nigeria, Oshogbo (*Simpson*), 1 ♂ type. *Exp.* 36 mm.

1847 *a*. *Creatonotus neurophæa*, sp. n.

♂. Head, thorax, and abdomen white; palpi above and sides of frons black; antennæ blackish; black spots above frons and on tegulæ and patagia; throat with tufts of blackish hair; fore coxæ and the femora above orange-yellow,

the tibiæ and tarsi blackish in front. Fore wing pure white; a black spot at base and discoidal point; vein 1 from before middle and the veins arising from cell except on costal area slightly streaked with blackish. Hind wing pure white with black discoidal point.

*Hab.* W. Africa (*M. Pounds*), 1 ♂ type. *Exp.* 40 mm.

1977 *b. Stenarctia griseipennis*, sp. n.

♂. Head and thorax grey tinged with brown; palpi black at sides; frons with black bar; antennæ black, the shaft white above, the tuft on basal joint crimson, a black spot between their bases and crimson points behind them; tegulæ with blackish spots at base of dorsum, the prothorax with blackish streaks; pectus whitish with pale crimson streaks below the shoulders; coxæ pale crimson, the fore coxæ with black spots, the legs striped black and whitish; abdomen fulvous yellow, the extremity crimson, subdorsal black spots except at base and extremity and a dorsal black spot on penultimate segment, sublateral series of black spots and a ventral series except at extremity. Fore wing grey with pale streaks on the veins; a subbasal black point below costa; an antemedial series of diffused fuscous streaks in the interspaces; obliquely placed medial black spots on costa and in cell, a discoidal spot and spot above it on costa; a curved fuscous postmedial shade interrupted by grey streaks on the veins. Hind wing ochreous yellow, the terminal area grey-brown, broadly at costa and narrowing to vein 1 where it terminates, the veins on it with slight pale streaks; the underside with the costal area suffused with fuscous brown.

*Hab.* S. Nigeria, Ilesha (*Humphrey*), 1 ♂ type. *Exp.* 40 mm.

1990 *a. Seirarctia alicia*, sp. n.

♂. Head yellow with some fuscous on frons; palpi and antennæ black; thorax whitish mixed with brown, the patagia fringed with yellow and crimson hair and with two small black spots near base; pectus and femora above crimson, the tibiæ and tarsi banded blackish and white; abdomen yellowish irrorated with brown, the hair at base crimson, lateral series of black spots and sublateral series of bars. Fore wing white strongly and thickly striated with black, the inner margin and cilia yellow; a postmedial black spot in discal fold. Hind wing orange-yellow, the base and inner area tinged with crimson; a black discoidal spot;

confluent subterminal spots on costal area and at discal fold and spots at veins 2 and 1. Underside of fore wing suffused with crimson, except the costal and terminal areas which are yellowish white thickly striated with black; hind wing with the costal area to beyond middle and the inner area suffused with crimson.

*Hab.* Br. E. Africa, Bueni (*Neave*), 1 ♂ type. *Exp.* 40 mm.

Genus Haplonerita, nov.

Type, *Idalus simplex*, Roths.

Proboscis fully developed; palpi upturned, slender, reaching to about middle of frons which is smooth; eyes large, round; antennæ of male bipectinate with very short branches to beyond middle, the apical part with bristles and cilia; hind tibiæ with two pairs of spurs. Fore wing triangular; veins 3, 4, 5 from angle of cell; 6 from upper angle; 7, 8, 9 stalked, 10 arising from cell and anastomosing with them to form an areole; 11 from cell; male with elongate fovea below middle of cell with tuft of hair in it on underside. Hind wing with veins 3 and 5 stalked, 4 absent; 6, 7 from upper angle; 8 strongly curved, from middle of cell, the costa highly arched.

2083 *a. Baroa siamica*, sp. n.

♀. Head and thorax pale yellow, the vertex of head, tegulæ, shoulders, patagia, and metathorax with black spots, the mesothorax with paired black spots; antennæ blackish except at base; palpi with black spots on first and second joints, the third joint black; pectus and legs grey-brown, the coxæ yellow; abdomen grey-brown, the dorsum black except towards base. Fore wing grey-brown, the veins, cell, submedian fold, and inner margin with slight grey streaks, vein 1 with a more prominent streak; a small black spot defined by yellowish at base. Hind wing blackish brown, the base and costa somewhat paler.

*Hab.* Siam, Muok-Lek (*Fruhstorfer*), 1 ♀ type. *Exp.* 36 mm.

2113 *b. Rhodogastria sarconota*, sp. n.

♂. Head and thorax very pale red-brown; palpi crimson with black points on the joints; antennæ dark brown, the basal joint black on inner side, crimson on outer; frons above, vertex of head, tips of tegulæ, patagia at base, and

paired spots on pro-, meso-, and metathorax black; shoulders with black spots; pectus and legs whitish, crimson streaks below the wings, femora above, the tibiæ and base of tarsi streaked with crimson, the fore tibiæ and the tarsi red-brown; abdomen crimson, with the five basal segments pale flesh-colour on dorsum, the ventral surface brown. Fore wing pale red-brown, the cell and area just below and beyond it semihyaline; a small black spot at base. Hind wing pale red-brown, the inner area paler.

*Hab.* S. Nigeria, Aro (*C. M. Gray*), 1 ♂ type. *Exp.* 50 mm.

2115 *a. Rhodogastria metasarca*, sp. n.

♂. Head and thorax pale red-brown; palpi pink, the first joint with black mark at side, the second and third joints black except at base; antennæ black except basal joint; frons and vertex of head with black points, the tegulæ dorsally and at sides, patagia, pro- and metathorax with paired black points; pectus and legs pink, the fore coxæ with black spots, the extremities of femora, the tibiæ, and tarsi streaked with black; abdomen pink with lateral and sublateral series of small black spots. Fore wings pale red-brown; a black point at base of costa and two in cell; a semihyaline patch beyond and below end of cell between veins 7 and 2, edged with darker brown on discocellulars and outer edge, and the veins on it red-brown. Hind wing pale flesh-pink, with a semihyaline patch in, beyond, and below end of cell, the veins crossing it pinkish; the apex tinged with brown; the underside with the costal area slightly tinged with brown.

*Hab.* S. Nigeria, Sapele (*Sampson*), 1 ♂ type. *Exp.* 54 mm.

Subsp. 1. Fore wing with the semihyaline patch beyond and below end of cell very indistinct and ill defined, much narrower beyond the cell; hind wing without semihyaline patch on disk.

*Hab.* Gold Coast, Accra, 1 ♂. *Exp.* 50 mm.

2116 *a. Rhodogastria castanea*, sp. n.

♂. Head and thorax red-brown; palpi pink with black mark at side of first joint, the second and third joints black except at base; frons with black points at sides and above; vertex of head with black spot; tegulæ dorsally and at sides, patagia, meso- and metathorax with paired black spots; pectus and legs pink, the fore coxæ with black spots, the legs

streaked with fuscous ; abdomen pink, with lateral and sublateral series of small black spots. Fore wing red-brown, the cell and the disk beyond and below it semihyaline, a black point at base of costa and two in cell. Hind wing semihyaline, the veins, costal and terminal areas pale reddish brown, the inner margin pale pinkish ; cilia pale.

*Hab.* S. Nigeria, Old Calabar (*Crompton*), 1 ♂ type. *Exp.* 54 mm.

Agaristidæ.

82 *a*. *Polacanthopoda humphreyi*, sp. n.

♂. Head black, white at side; palpi white at base, the extremity of second joint and base of third white ; antennæ with the shaft white above ; thorax deep chocolate-red with the dorsum black, the tegulæ with white stripes, the thorax with white dorsal streak, the patagia with white stripes and orange hair on upper edge ; pectus orange with some white at neck ; fore legs black with orange streaks on femora and tibiæ, the latter fringed with white on outer side, the mid and hind legs orange, the mid tibiæ with black spots near base and extremity and white ring at extremity, the hind tibiæ with black spot near extremity and white ring at extremity, the tarsi black ; abdomen orange with black dorsal stripe and some silvery scales in the crests, a black segmental line on fourth segment, the three terminal segments black ringed with white, the ventral surface with the four terminal segments black with patches of white. Fore wing deep chocolate-red, the costal area blackish to beyond middle, the terminal area redder ; a silvery streak on base of vein 1 ; an oblique white striga from base of costa ; a very oblique subbasal yellowish-white line from costa to submedian fold, with silvery spot before it below costa and line from cell to vein 1 ; an oblique white line irrorated with black from below costa before middle to below middle of cell, with silvery mark below it above vein 1 ; some silver below antemedial part of costa and an oblique bar across middle of cell ; an oblique white bar across end of cell ; a silvery discoidal bar with some silver above it below costa, a yellowish spot below vein 2 and silver striga at inner margin ; an oblique postmedial series of white streaks irrorated with black in the interspaces from costa to vein 3, then white irroration to inner margin with a silvery line before it, followed by an oblique white line from costa to vein 2, and dentate between the streaks towards its lower extremity, then by a silvery line from costa to vein 4; a subterminal series of slight

whitish streaks irrorated with blackish on each side of the veins. Hind wing deep orange with broad black terminal band, its inner edge incurved below vein 2; cilia chequered black and white; the underside with black spot at upper angle of cell, the terminal band with whitish diffused spots before termen except towards apex and tornus.

*Hab.* S. Nigeria, Ilesha (*Humphrey*), 3 ♂ type. *Exp.* 50 mm.

88 *a. Rothia subterminalis*, sp. n.

♀. Head and thorax black; palpi with two white points; frons with lateral white points; antennæ with the basal joint white in front; gulæ white; tegulæ with dorsal and lateral white points, the shoulders with white points, the patagia, meso- and metathorax with paired white points; tibiæ with broad orange bands, the tarsi ringed with white; abdomen black, with white segmental lines and sublateral and ventral series of white spots, the anal tuft orange. Fore wing black; three white points at base; an antemedial series of four small pale yellow spots; a medial patch from below costa to below cell and a spot above vein 1; a patch from below costa across end of cell and a triangular spot below end of cell; a postmedial band from below costa to vein 3; a subterminal series of greenish-white spots in the interspaces, the spots towards apex elongate, the spot above tornus pale yellow; a slight greenish-white streak above middle of inner margin; the antemedial area with some silvery blue in cell and submedian interspace, a bar across middle of cell and patch below the cell, a discoidal bar from just below costa to below angle of cell and spot above inner margin; cilia pale yellow at tips. Hind wing scarlet with some black at base; a black terminal band slightly incurved at veins 3, 2; cilia yellowish white at tips. Underside of fore wing with the markings bright yellow, the patch in end of cell conjoined to the spot below the cell and spot above tornus, the subterminal spots absent.

*Hab.* Germ. E. Africa, Mt. Rungwe, 6500′ (*Neave*), 2 ♀ type. *Exp.* 42 mm.

145 *a. Mimeusemia vilemani*, sp. n.

♂. Head and thorax black, the vertex of head, tegulæ, and patagia with white stripes, the metathorax with small white spot; palpi with some white at base and white ring at extremity of second joint; pectus orange, the tibiæ banded with orange, the tarsi ringed with white; abdomen banded

black and orange. Fore wing black; a rounded yellowish-white antemedial spot in cell, medial elliptical spot from discal fold to well below vein 2 and obliquely placed postmedial spots beyond the angles of cell, the upper rounded, the lower rather triangular; some silvery-blue irroration below costa to end of cell, short streak above base of vein 1, medial spots in and below cell and above vein 1, discoidal striga, slight curved postmedial series of spots, and two spots at tornus; cilia white at apex and above tornus. Hind wing orange, the basal, costal, and terminal areas black, the black apical area expanding quadrately into the cell to origin of vein 2 and with bar-shaped yellowish-white spot on it between veins 7 and 4; cilia with some white towards apex and above vein 1.

*Hab.* Formosa, Kanshirei (*Wileman*), 1 ♂ type. *Exp.* 46 mm.

## Noctuidæ.

### *Agrotinæ.*

231 *a*. *Agrotiphila tenera*, sp. n.

♂. Head, thorax, and abdomen clothed with grey and brownish hair; antennæ black. Fore wing grey irrorated with reddish brown, the costal edge blackish towards base; antemedial line brown, waved; a small black spot at middle of cell and rather diffused discoidal lunule; postmedial line brown, bent outwards below costa, then dentate, angled inwards at discal fold and incurved below vein 4; some blackish on costa towards apex; subterminal line brown, minutely dentate, incurved at discal fold; a fine brown terminal line with blackish striæ on it. Hind wing grey suffused with brown, the cilia whitish except at base; the underside grey irrorated with brown, a slight discoidal spot and rather diffused postmedial line.

*Hab.* Tibet, Lanark Valley, 15,000′ (*Bailey*), 1 ♂ type. *Exp.* 22 mm.

267 *a*. *Micragrotis nigrisigna*, sp. n.

♀. Head and thorax black-brown, the tegulæ with black medial line; the spurs and tarsi with whitish rings; abdomen brown mixed with greyish, the ventral surface blackish. Fore wing fuscous brown; double subbasal black striæ from costa; antemedial line with double black striæ from costa, then indistinct, waved; claviform small, defined by black above and at extremity; orbicular and reniform defined by

black, the former round, the latter constricted at middle, two slight black streaks between them; postmedial line with double black striæ from costa, then indistinct, bent outwards below costa, then dentate and produced to slight black points on the veins, some grey points beyond it on costa; subterminal line represented by a grey striga from costa with some blackish suffusion before it; a terminal series of black points. Hind wing greyish suffused with fuscous brown, the cilia pale with a dark line through them from apex to vein 2; the underside greyer with indistinct dark sinuous postmedial line with minute black striæ on the veins.

*Hab.* Br. C. Africa, Up. Shire Valley (*Neave*), 1 ♀ type. *Exp.* 30 mm.

638 *a. Hermonassa oleographa*, sp. n.

Head and thorax ochreous brown mixed with olive-green and some blackish; palpi with black patches at sides of first and second joints; frons with lateral black bars; antennæ black; fore coxæ and the tibiæ with black patches, the tarsi black ringed with ochreous; abdomen ochreous suffused with fuscous brown, the ventral surface black with lateral and sublateral series of ochreous spots and a patch at extremity. Fore wing brownish ochreous, the medial area suffused with olive-green except towards costa and inner margin; subbasal line represented by double black spots on costa; antemedial line grey, sinuous, double at inner margin and with double black spots on costa; claviform and orbicular defined by grey, the latter round; reniform black with grey annulus; a medial black spot on costa and indistinct incurved line from lower angle of cell to inner margin; postmedial line with double black spots at costa, strongly bent outwards and obsolescent below costa, then indistinct and double with a series of black points beyond it, the costa beyond it black with some white points; subterminal line pale defined on inner side by black towards costa, then by slight olive marks and on outer side by slight black points, slightly excurved below vein 7 and at middle; a terminal series of small black spots; cilia with a series of fuscous lunules at base and blackish tips. Hind wing pale brown, a fine pale line at base of cilia; the underside grey, the costal area ochreous irrorated with black and with two black bars towards apex, a slight discoidal lunule, traces of sinuous postmedial line and some black points on termen towards apex.

*Hab.* Sikhim (*Möller*), 1 ♂, 1 ♀ type. *Exp.* 36 mm.

761 *a. Agrotis bisignata,* sp. n.

♀. Head and thorax rufous; palpi except at tips and sides of frons blackish; tegulæ black at base; mid and hind legs banded with black, the fore tarsi black at tips; abdomen grey dorsally tinged with fuscous and with lateral and subventral series of black spots. Fore wing rufous slightly irrorated with brown, the costal area whitish to beyond middle; an irregular black streak below base of cell; subbasal black points on costa and in cell; antemedial line double, with black points on costa and defined by black on inner side from subcostal nervure to submedian fold, waved, excurved above inner margin; claviform represented by a black point at its extremity; orbicular with whitish annulus defined at sides by black, round, the reniform with whitish annulus and black point on its outer edge, a quadrate black patch between them with blackish mark above it on costa; postmedial line double, dark with small black spots at costa, bent outwards below costa, then dentate, excurved to vein 4, then incurved; a black patch on costa before the very indistinct pale somewhat dentate subterminal line, excurved below vein 7 and at middle; a fine pale terminal line with series of slight black points on it. Hind wing pale brown, the cilia whitish tinged with rufous; the underside with the costal area tinged with rufous and striated with fuscous, a small blackish discoidal spot, postmedial line oblique and black towards costa, then faint and excurved at middle, and terminal series of black points from apex to vein 2.

*Hab.* S. Nigeria, Ilesha (*Humphrey*), 1 ♀ type. *Exp.* 40 mm.

776 *a. Agrotis mesosema,* sp. n.

♀. Head and thorax red-brown mixed with fuscous and whitish; palpi except at tips and sides of frons blackish; tegulæ mostly black with curved rufous medial marks; metathorax with white patch; pectus whitish; tibiæ and tarsi blackish ringed with white; abdomen pale brown, the base whitish, the ventral surface whitish irrorated with brown. Fore wing grey-brown with darker irroration, the basal half of costal area and antemedial area with rufous marks; a waved black subbasal line from costa to submedian fold defined on outer side by rufous; a diffused blackish streak below base of cell; antemedial line indistinct, oblique, waved, defined on inner side by rufous; claviform represented by a short black streak; orbicular and reniform with some rufous suffusion in centres, the former defined by

black, round, the latter defined by black except below, a black streak between them ; postmedial line with double blackish spots at costa, then indistinct, bent outwards below costa, then dentate, excurved to vein 4, then oblique; a fuscous patch on costa before the hardly traceable pale curved subterminal line; a terminal series of black points; cilia white tinged with rufous. Hind wing pure white, the apical area faintly tinged with brown ; a slight brownish terminal line except towards tornus ; the underside with the costal area striated with brown, a small brown discoidal spot, slightly curved postmedial line with points on the veins and some points on termen towards apex.

*Hab.* Transvaal, Johannesburg (*Cooke*), 1 ♀ type. *Exp.* 42 mm.

832 *b. Episilia ochricraspia*, sp. n.

Head and thorax deep rufous to blackish rufous ; palpi with the extremities of second and third joints pale ochreous ; shoulders with pale ochreous patches ; abdomen rufous, the basal segments dorsally clothed with grey-brown hair. Fore wing deep rufous to blackish rufous, the costal area pale ochreous to beyond middle, expanding to median nervure on basal area and confluent with the ochreous semi-elliptical orbicular and large reniform stigmata, the latter with some brown scales in centre; some grey hair at base of inner margin ; faint traces of a sinuous greyish antemedial line and curved postmedial line oblique below vein 4; a rather more distinct waved subterminal line. Hind wing grey tinged with reddish brown especially in female ; a faint discoidal lunule ; cilia reddish ochreous with slight dark line near tips from apex to vein 2 ; the underside greyish, the costal area suffused with rufous, a dark discoidal spot and terminal series of dark striæ from apex to vein 2.

*Hab.* Falkland Is., East I. (*Reid*), 9 ♂, 1 ♀ type. *Exp.* 40–44 mm.

958 *a. Lycophotia atrisigna*, sp. n.

♂. Head and base of tegulæ yellowish white with a few brown scales; palpi and antennæ blackish, the former yellowish white at tips ; tegulæ with black medial line, the tips of tegulæ and thorax purplish grey ; pectus and legs brown, the tibiæ with some yellow hair, the tarsi ringed with white ; abdomen white tinged with brown, the ventral surface brown except at base. Fore wing purplish grey with some yellowish at base, the base of submedian fold and

veins and interspaces of terminal area with slight blackish streaks; an indistinct double dentate antemedial line with some yellowish scales on it; orbicular and reniform small, grey with slight yellowish annuli incompletely defined by black, the former round, a rather elongate black patch between them; traces of a minutely dentate postmedial line, excurved from costa to vein 4, then incurved, some yellowish points beyond it on costa; cilia yellowish mixed with fuscous. Hind wing pure white, the cilia fuscous at apex; the underside with the costal area irrorated with brown except towards base.

*Hab.* Natal, Durban (*Leigh*), 1 ♂ type. *Exp.* 34 mm.

1009 *a*. *Lycophotia viridis*, sp. n.

♀. Head white mixed with reddish brown; palpi black at sides, red-brown in front and white at tips; antennæ brown; thorax red-brown mixed with grey, the tegulæ white at base and with black medial line, the patagia with pale green and blackish patches, the metathorax with white patch; pectus rufous, the tibiæ and tarsi with black and white bands; abdomen brown. Fore wing whitish suffused with sap-green and irrorated with dark brown, the basal half of costal area and cell white; subbasal line blackish defined on outer side by white, waved, from costa to submedian fold, with short black streaks beyond it on costa and below the cell; antemedial line blackish defined on inner side by white, waved; claviform defined by blackish at extremity; orbicular white defined at sides by black, round, the reniform with its centre suffused with brown, defined on inner side by a waved white line and on outer side and below by black points, a quadrate black patch between them with blackish mark above it on costa; an indistinct oblique dark line from lower angle of cell to inner margin; postmedial line whitish with two black points at costa, bent outwards below costa, then dentate and with black points on its outer edge, excurved to vein 4, then oblique; subterminal line faint, whitish, minutely waved, with blackish spots before it at costa, discal fold and above and below vein 2; a terminal series of black points; cilia whitish tinged with rufous. Hind wing pale brown with a rufous tinge, the cilia white faintly tinged with rufous; the underside white tinged with rufous, the costal area irrorated with brown, a small discoidal spot and slightly curved postmedial line.

*Hab.* S. Nigeria, Ilesha (*Humphrey*), 1 ♀ type. *Exp.* 34 mm.

*Hadeninæ.*

1208 *m. Elusa binocula*, sp. n.

♂. Head and thorax glossy red-brown, the palpi in front and frons paler red; pectus greyish; abdomen reddish brown, the extremity and ventral surface whitish tinged with rufous. Fore wing glossy red-brown; traces of a double oblique dark sinuous antemedial line; two small round obliquely placed fuscous discoidal spots, slightly defined by whitish and connected by a whitish bar; a faint dark medial shade, oblique from lower angle of cell to inner margin; postmedial line black, produced to short streaks on the veins, excurved to vein 4, then incurved and bent outwards above inner margin; an indistinct straight yellowish subterminal line defined on inner side by a maculate black line; a fine blackish terminal line. Hind wing glossy reddish brown, the cilia rufous; the underside greyish tinged with brown, a brown discoidal lunule with shade above it from costa, and curved minutely dentate postmedial line.

*Hab.* Dutch N. Guinea, Fak-fak (*Pratt*), 2 ♂ type. *Exp.* 26–30 mm.

1346 *a. Miselia albipuncta*, sp. n.

♂. Head and thorax fuscous brown mixed with grey; tarsi ringed with white; abdomen grey-brown, the anal tuft tinged with rufous, the genital tufts white. Fore wing glossy red-brown; subbasal line blackish, waved, from costa to submedian fold, a diffused grey-brown band beyond it with a white point on it in the cell; antemedial line blackish, waved; orbicular and reniform grey-brown defined by black, the former rounded, the latter somewhat constricted at middle and placed on the curved grey-brown medial shade; postmedial line blackish, bent outwards below costa, then dentate, oblique below vein 4; a grey-brown shade before the subterminal series of minute dentate black spots with white points on their outer edges, the white point above vein 6 more prominent and in submedian fold forming a conspicuous white spot; cilia dark brown and ochreous with a punctiform ochreous line at base. Hind wing brown, the interspaces of basal half whitish; cilia whitish with a brown line through them from apex to vein 2; the underside whitish, the costal and terminal areas suffused with brown and irrorated with white, a dark discoidal lunule and sinuous postmedial line.

Ab. 1. Head, thorax, and abdomen greyer; fore wing

more tinged with grey-brown, the whole terminal area grey-brown.

*Hab.* Peru, Aqualani (*Ockenden*), 1 ♂ type, Limbane (*Ockenden*), 1 ♂. *Exp.* 36 mm.

1374 *a*. *Miselia meyricci*, n. n.

*Meterana pictula*, Butl. P. Z. S. 1877, p. 386, pl. 42. f. 1; Hudson, New Zealand Moths & Butterflies, p. 19, pl. 4. f. 37 (nec White).

The species from the S. Island with the white spot on reniform of fore wing, the hind wing pink with fuscous terminal band.

*Hab.* N. Zealand, S. Island, Otago (*Enys, Hamilton*), 1 ♂, 1 ♀, Lake Coleridge. *Exp.* 40–42 mm.

*M. pictula*, White, type in B.M. agreeing with the figure =*rhodopleura*, Meyr., is the species from the N. Island without the white spot on reniform of fore wing, the hind wing suffused with fuscous except the inner margin.

1510 *a*. *Chabuata chionosema*, sp. n.

♂. Head and thorax purple-red, the tip of prothoracic crest and a streak on dorsum of thorax white mixed with brown; palpi with some ochreous and brown mixed; antennæ brown ringed with ochreous towards base; pectus with some grey; tarsi ringed with ochreous; abdomen brown with some ochreous at base, the sides and ventral surface purplish pink, the basal crest with grey mixed, the anal tuft red, ochreous at tip. Fore wing red-brown, the interspaces of basal half fiery red and ochreous, the postmedial area fiery red, the inner margin beyond middle and terminal area purplish; subbasal line represented by double brown striæ from costa; antemedial line double, brown, waved; claviform red, faintly defined by brown at extremity; orbicular and reniform fiery red mixed with yellow and defined by brown, the former round, the latter defined on outer side and below by pure white points and striæ; traces of an oblique sinuous line from lower angle of cell to inner margin; postmedial line brown with yellow spot at costa, bent outwards below costa, then dentate, excurved to vein 4, then oblique, some white points beyond it on costa; subterminal line brown with some yellow scales on its outer side towards costa, waved, excurved below vein 7 and at middle; cilia with a fine ochreous line at base. Hind wing ochreous, the veins and terminal half suffused with brown, the termen tinged with purple to submedian

fold; cilia ochreous, the underside ochreous, the costal and terminal areas thickly irrorated with purple, a black mark in cell, discoidal spot, sinuous postmedial line with minute dark streaks on the veins, and some slight lunules on termen from apex to vein 2.

*Hab.* Peru, S. Domingo (*Ockenden*), 1 ♂ type. *Exp.* 44 mm.

1602 *a*. *Eriopyga euchroa*, sp. n.

♂. Head and thorax rufous, the metathoracic crest black-brown; palpi and sides of frons black with some rufous scales; antennæ blackish; legs irrorated and suffused with black, the tarsi blackish ringed with ochreous; abdomen rufous, the basal crest and medial segments tinged with fuscous, the ventral surface red-brown except at extremity. Fore wing ochreous suffused with rufous; a black point at base; subbasal line double, black filled in with ochreous, waved, from costa to vein 1; antemedial line double, black at costa, then red-brown with blackish points at the veins, waved, incurved in cell and angled inwards on vein 1; orbicular deep rufous defined above by blackish, angled outwards at lower extremity; reniform rufous, its centre and outline defined by dark brown, below open and defined by small black spots and a white point at lower extremity, angled inwards on median nervure, a dark brown patch beyond it and another above it on costa, an oblique rufous shade from lower angle of cell to inner margin; postmedial line represented by a double series of black points and striæ filled in with ochreous, slightly bent outwards below costa, then with faint pale streaks and dark points beyond it on the veins, excurved to vein 4, then incurved, some white points beyond it on costa; subterminal line slight, ochreous defined on inner side by a rufous bar from costa, then by minute spots, excurved below vein 7 and ending at tornus; a terminal series of minute black lunules; cilia with a series of rufous lunules. Hind wing greyish ochreous suffused with brown except on inner area, the terminal area darker; a faint dark postmedial line; cilia reddish ochreous with a brownish line near base; the underside ochreous, the costal area irrorated with brown, a slight black discoidal lunule and rather diffused postmedial line from costa to discal fold.

♀. Abdomen suffused with fuscous except at base and extremity; fore wing slightly tinged with greyish, the

orbicular produced to the reniform; hind wing more uniformly suffused with brown.

*Hab.* Colombia, Monte Socorro; Peru, Aqualani (*Ockenden*), 1 ♂, 1 ♀ type. *Exp.*, ♂ 48, ♀ 54 mm.

1646 *b*. *Eriopyga prasinospila*, sp. n.

♂. Head and tegulæ whitish tinged with brown, the palpi and antennæ dark brown; thorax red-brown; pectus and legs rufous and whitish, the tarsi blackish ringed with whitish; abdomen fuscous, the extremity ochreous, the ventral surface rufous and whitish. Fore wing red-brown slightly tinged with grey; subbasal line slight, black defined by some grey and yellow-green, slightly angled outwards below costa and ending at submedian fold; antemedial line blackish, with a green spot on it at submedian fold, oblique, dentate; orbicular a small round yellow-green spot; reniform yellow-green with its centre defined by red-brown, slightly angled inwards on median nervure; postmedial line black with some grey on it, bent outwards below costa, then strongly dentate and produced to points at the veins, excurved to vein 4, then oblique; a subterminal series of small yellow-green spots and larger patch at apex. Hind wing fuscous brown, the basal area and inner area except towards tornus whitish; traces of a discoidal spot and curved postmedial line; cilia whitish tinged with rufous; the underside whitish, the costal area thickly irrorated with red, a small black discoidal spot and punctiform postmedial line.

*Hab.* W. Colombia, R. Cauca, Guabinas, 1 ♂ type. *Exp.* 40 mm.

1671 *a*. *Morrisonia chlorodonta*, sp. n.

♀. Head and thorax bright rufous mixed with purple-grey especially on patagia, the tegulæ with black line near tips; abdomen rufous. Fore wing bright rufous mixed with purple-grey and some olive-green; subbasal line double, black filled in with purple, dentate, bent inwards to base at vein 1, an oblique white striga beyond it across the cell and an olive-green patch above vein 1; antemedial line black defined on inner side by purple, slightly angled outwards below costa and excurved below the cell; claviform large, defined by black and white above and at extremity; orbicular and reniform large, with brown and green centres and white annuli defined by black, the former rather oblique elliptical, the latter with curved whitish striga in centre; postmedial line black defined on outer side by purple, double at costa,

bent outwards below costa, then minutely dentate, incurved below vein 3, some whitish points beyond it on costa; subterminal line white with olive-green suffusion before it except towards costa and inner margin and defined on outer side by black, incurved below costa, angled outwards at vein 7 and dentate to termen at veins 4 and 3; a fine waved black terminal line. Hind wing red-brown with a fine pale line at base of cilia; the underside whitish thickly irrorated with red-brown, a dark discoidal spot and obliquely curved postmedial line.

Ab. 1. Head and thorax olive-green mixed with purple-grey; abdomen brown mixed with whitish; fore wing purple-grey mixed with olive-green and without rufous; hind wing paler.

*Hab.* N. Zealand, N. Island, Ngarua Wahia (*Longstaff*), 1 ♀ type, Taumaranui. *Exp.* 32–34 mm.

1674 *a*. *Morrisonia oliveri*, sp. n.

♀. Head and thorax grey-white, the vertex of head, tegulæ, and dorsum of thorax tinged with brown, the outer edge of patagia brown; palpi brown; frons with lateral black bars; fore tibiæ and tarsi suffused with brown; abdomen whitish tinged with grey-brown. Fore wing whitish faintly tinged with rufous, the area from subcostal nervure to above inner margin suffused with olive and blackish to postmedial line, the veins and submedian fold remaining whitish; a strong black streak below base of cell; antemedial line black defined on inner side by white, oblique, waved, from subcostal nervure to above inner margin; orbicular defined by black and with some whitish in centre, oblique; reniform defined by black, narrow, angled inwards on median nervure to below orbicular; postmedial line black defined on outer side by white, slightly bent outwards below costa, then oblique, dentate, angled inwards in submedian fold to near antemedial line; subterminal line represented by the outer edge of the white area, defined on inner side by dentate black marks below costa and from vein 6 to submedian fold, angled outwards to termen at apex and veins 7, 4, 3, the area beyond it olive and blackish; a pale line at base of cilia. Hind wing grey suffused with fuscous brown; the underside white tinged with grey, a dark discoidal spot and diffused curved postmedial line.

*Hab.* N. Zealand, S. Island, Wakatipu, Bold Peak (*Oliver*), 1 ♀ type. *Exp.* 46 mm.

1884 *a*. *Cirphis atritorna*, sp. n.

♀. Head and thorax red-brown mixed with greyish ochreous; palpi with the second joint blackish at sides; frons with black bar; tegulæ with black medial line and fuscous lines near base and tips; abdomen grey suffused with fuscous, the sides and ventral surface towards extremity ochreous suffused with red-brown. Fore wing red-brown sparsely irrorated with blackish, the costa with black striæ; a white point at base of cell, black subbasal point in cell and brown patch below base of cell; antemedial black points on costa and veins and patch on inner margin; orbicular an oblique reddish-white bar connected with the very narrow reniform defined by reddish white and a white streak on extremity of median nervure; postmedial line represented by a small black spot on costa, then by a curved series of points on the veins; three small black spots on costa towards apex; a red-brown patch on termen at discal fold and oblique blackish patch on tornal area; cilia with series of black points near base, blackish towards tornus. Hind wing fuscous brown with a cupreous tinge; cilia white tinged with rufous and with red-brown line through them from apex to vein 2; the underside grey, the costal area and terminal area to vein 2 suffused with rufous and striated with black, a black discoidal spot, diffused postmedial line and series of black points and striæ on termen.

*Hab.* S. Nigeria, Ilesha (*Humphrey*), 1 ♀ type. *Exp.* 34 mm.

2047 *a*. *Leucania yuconensis*, sp. n.

Head and thorax wood-brown; abdomen grey suffused with fuscous brown except the anal tuft which is white tinged with brown. Fore wing wood-brown slightly irrorated with fuscous, the veins slightly streaked with whitish, the interspaces of terminal area with faint dark streaks; a black discoidal point and postmedial points on veins 5 and 2; a terminal series of minute points. Hind wing fuscous black with some whitish at base; cilia white tinged with brown at base; the underside irrorated with white, the costal area whitish at base, the veins streaked with white, a terminal series of black points from apex to vein 2.

*Hab.* Canada, Yukon, Dawson City (*G. A. Day*), 1 ♂, 1 ♀ type. *Exp.* 32 mm.

*Cucullianæ.*

2494 *a*. *Eumichtis subterminalis*, sp. n.

♂. Head and thorax brown; the patagia with oblique whitish streak edged with some black scales; the metathoracic crest rufous; abdomen brown mixed with grey. Fore wing red-brown mixed with dark brown and sap-green, the terminal area whitish; subbasal line double, black filled in with green, minutely waved, from costa to vein 1; antemedial line double, black filled in with green and defined on outer side by green, waved; claviform defined by white and black at extremity; orbicular and reniform with incomplete whitish annuli defined at sides by black, the former round, the latter slightly angled inwards on median nervure; postmedial line double, black filled in with green and defined on inner side by green, bent outwards below costa, then oblique to vein 6, slightly incurved at discal fold, oblique and sinuous below vein 4, some whitish points beyond it on costa; subterminal line whitish, slightly waved towards costa and with small tooth on inner side at vein 5, oblique below vein 3 and slightly incurved at submedian fold; a terminal series of black lunules. Hind wing whitish suffused with brown, an indistinct sinuous postmedial line and waved terminal line; cilia whitish with a brown line through them; the underside whiter, the costal and terminal areas irrorated with black-brown, a discoidal lunule and waved postmedial line.

♀. Fore wing with the subterminal line forming a prominent white band, its inner edge incurved below costa, at discal fold, and below vein 3, the area beyond it dark.

*Hab.* Colombia, Pasta, 1 ♂, 1 ♀ type. *Exp.* 38 mm.

*Acronyctinæ.*

2799 *a*. *Stenopterygia hemiphæa*, sp. n.

Head and thorax white mixed with red-brown; palpi brown at sides, the extremities of second and third joints white; frons with lateral blackish bars; tarsi blackish with pale rings; abdomen whitish tinged with brown. Fore wing ochreous white, the basal half suffused with black, the terminal half with cupreous brown, a rather whiter zone between the two areas; traces of a waved black subbasal line from costa to submedian fold; traces of a waved antemedial line; reniform faintly defined by white; postmedial line indistinct, black, strongly bent outwards below costa, then strongly dentate, oblique below vein 4, some whitish points

beyond it on costa; traces of a whitish subterminal line defined by slight blackish streaks before and beyond it on the veins, incurved below costa, then dentate; a fine whitish line at base of cilia. Hind wing cupreous brown, the cilia with a fine whitish line at base and whitish tips; the underside with the basal half whitish tinged with brown, a dark discoidal point.

*Hab.* Penang (*Ridley*), 1 ♀; Singapore (*Ridley*), 1 ♂ type. *Exp.* 34 mm.

2963 *a. Trachea atriplaga*, sp. n.

♂. Head and thorax grey mixed with brown; abdomen white tinged with brown, the basal crests blackish, the ventral surface irrorated with brown. Fore wing grey thickly irrorated with dark brown, the postmedial area suffused with reddish brown except at costa; a whitish subbasal line from costa to submedian fold; an indistinct whitish antemedial line, minutely waved, strongly excurved above inner margin; claviform a large black-brown patch extending to median nervure; orbicular and reniform large with indistinct whitish annuli, elliptical; postmedial line indistinct, whitish slightly defined on inner side by brown, bent outwards below costa, then sinuous, incurved below vein 4, some white points beyond it on costa; a whitish subterminal line, slightly angled outwards at vein 7, then curved; a terminal series of slight black lunules. Hind wing pure white with a terminal series of dark striæ; the underside with the costal area irrorated with brown.

*Hab.* Uganda, Kasuye (*Sclater*), 1 ♂ type. *Exp.* 32 mm.

2974 *a. Trachea hyposcota*, sp. n.

♂. Head, thorax, and abdomen bright red-brown; palpi blackish at sides except at tips; tarsi blackish with pale rings. Fore wing bright red-brown slightly irrorated with ochreous; subbasal line represented by double blackish striæ from costa and cell, a whitish point beyond them in the cell; antemedial line double, blackish, angled outwards below costa in submedian fold and above inner margin, and inwards in cell and on vein 1, some black before it above inner margin; claviform deep red-brown defined by blackish, short and broad, extending to median nervure; orbicular and reniform with their annuli represented by white points incompletely defined by black, the former round, the latter with ochreous spot in outer part of centre; a small medial

blackish spot on costa and traces of a sinuous line from lower angle of cell to inner margin ; postmedial line double, filled in with ochreous at costa, then minutely waved, oblique to vein 3 near subterminal line, then incurved, some whitish points beyond it on costa; subterminal line represented by a series of small whitish lunules with short black streaks before and beyond them, slightly excurved below vein 7 and at middle; the veins of terminal area with slight blackish streaks ending in white points; a terminal series of black points in the interspaces. Hind wing bright glossy red-brown, the cilia reddish ochreous with a dark line through them. Underside of fore wing black-brown except costal and terminal areas ; hind wing with the costal area except at base and terminal area to vein 5 clothed with black-brown hairy scales, the rest of wing whitish, a black discoidal spot and minutely waved postmedial line from costa to vein 3 and some black lunules on termen.

♀. Fore wing darker red-brown more variegated with ochreous, the spot in reniform whitish ; hind wing darker, the underside with the costal area suffused with red-brown, a dark subterminal shade from costa to submedian fold.

*Hab.* Ceylon, Peradenyia (*Mackwood*), 1 ♂ type, Kandy (*Mackwood*), 1 ♀. *Exp.* 38–40 mm.

2974 *b*. *Trachea niveipuncta*, sp. n.

*Trachea consummata* ab. 4, Hmpsn. Cat. Lep. Phal. B. M. vii. p. 201.

♂. Head and thorax bright red-brown with a few blackish scales, the tegulæ with blackish medial line ; palpi blackish at sides except at tips ; tarsi blackish ringed with rufous ; abdomen greyish brown, the crests, anal tuft, and ventral surface rufous. Fore wing bright red-brown irrorated with blackish, the terminal area slightly darker except at apex ; subbasal line represented by double black striæ from costa and cell ; antemedial line double, blackish, slightly angled outwards below costa, in submedian fold and above inner margin, and inwards in cell and on vein 1, some black before it above inner margin; claviform black-brown defined by black, short and broad, extending to median nervure ; orbicular and reniform with their annuli represented by some white points incompletely defined by black, the former oblique, the latter with ochreous lunule in outer part of centre ; a blackish spot at middle of costa and traces of a sinuous line from lower angle of cell to inner margin ; postmedial line double, bent outwards below costa, then minutely

waved, oblique to vein 3 near subterminal line, then slightly incurved, some ochreous points beyond it on costa; subterminal line represented by a series of minute pale lunules with short black streaks before and beyond them; the veins of terminal area with slight black streaks ending in white points; a terminal series of black points in the interspaces. Hind wing glossy red-brown, the cilia rufous. Underside of fore wing black-brown except costal and terminal areas; hind wing whitish, the costal area tinged with rufous, a black discoidal spot, curved, minutely waved postmedial line and subterminal shade from costa to vein 3.

♀. Fore wing with the spot in the reniform pure white.

*Hab.* Ceylon, Galboda (*Mackwood*), 1 ♂, 2 ♀ type. *Exp.* 40–42 mm.

*T. hyposcota* and this species may be known from *T. consummata* by the black-brown underside of fore wing, the former having in the male the costal area of hind wing also black-brown, this species having the spot in reniform of female pure white.

3065 *a*. *Cropia leucodonta*, sp. n.

Antennæ of male simple and somewhat laminate.

Head and thorax reddish brown with a few black scales; palpi dark brown, the second joint white in front; pectus whitish; tarsi dark brown ringed with whitish; abdomen brown, the crests very large and reddish brown, the ventral surface whitish at base. Fore wing dark reddish brown mixed with greyish; subbasal line pale slightly defined on each side by black, waved, from costa to vein 1; antemedial line pale slightly defined by black, oblique, minutely waved, angled outwards below costa and inwards at vein 1; claviform defined by black at extremity; orbicular grey-brown defined by black except above, large, rounded; reniform defined by black on inner side and by white on outer, slightly angled inwards on median nervure; postmedial line double and filled in with white at costa, then very oblique and defined on each side by white to vein 6 near subterminal line, then double filled in with greyish and defined on outer side by greyish and oblique to inner margin, some white points beyond it on costa and an oblique wedge-shaped white streak below costa; subterminal line whitish, slightly excurved at vein 7, excurved and waved at middle; a series of black and white points before termen; a fine white line at base of cilia. Hind wing cupreous red-brown; cilia white

at base ; the underside whitish thickly irrorated with brown, an oblique dark medial line, discoidal spot, and crenulate postmedial line.

*Hab.* W. Colombia, San Antonio (*Palmer*), 1 ♂, 1 ♀ type. *Exp.*, ♂ 30, ♀ 34 mm.

3078 *a*. *Heterochroma thermeola*, sp. n.

♂. Head and thorax red-brown mixed with black and a few whitish scales ; tegulæ with blackish medial shade ; abdomen rufous mixed with greyish ochreous, the crests darker at tips. Fore wing bright rufous irrorated with black ; subbasal line represented by pale greenish striæ from costa and cell defined on each side by black ; a patch of black suffusion from cell to inner margin before the antemedial line which is double, black filled in with greenish, oblique to above inner margin to which it is strongly bent inwards ; claviform defined by greenish and black at extremity ; orbicular with black centre and greenish annulus, somewhat constricted at middle ; the end of cell filled in by a black patch ; the reniform with rufous centre defined by black and greenish annulus angled inwards on median nervure and extending to well below the cell ; postmedial line double, black filled in with pinkish, strongly bent outwards below costa, oblique to vein 6 where it is angled, incurved below vein 4, and dentate at veins 4, 3, 1, bent outwards to inner margin ; the postmedial area with white points on costa, large blackish patches below costa, at and below middle, and rufous dentate marks on veins 6, 4, 3 ; subterminal line whitish, slightly bent outwards to costa and excurved at vein 1 ; a terminal series of blackish lunules ; cilia with waved ochreous line at base and ochreous streaks intersecting the dark tips at the veins. Hind wing cupreous red-brown, yellowish at base ; cilia yellowish at base ; the underside paler irrorated with brown, a blackish discoidal spot and crenulate postmedial line.

*Hab.* W. Colombia, R. Dagua, Naranjito, 1 ♂ type. *Exp.* 46 mm.

3149 *a*. *Perigea micragalla*, sp. n.

♂. Head, thorax, and abdomen red-brown mixed with greyish. Fore wing grey suffused with rufous and slightly irrorated with blackish ; subbasal line represented by an oblique grey striga from costa and black point below the cell ; antemedial line indistinct, double, black filled in with greyish,

oblique, sinuous, incurved at vein 1; orbicular with yellowish centre and white annulus defined by black, open above, small, oblique elliptical; reniform with yellowish centre defined by black and slight white annulus, narrow; some deep rufous in cell before and between the stigmata; medial line faint and rather diffused, oblique to the reniform and sinuous from lower angle of cell to inner margin; postmedial line black slightly defined on outer side by whitish, bent outwards below costa, then minutely waved and produced to blackish streaks with white points on them on the veins, incurved below vein 4, some rufous points beyond it on costa; subterminal line indistinct whitish with some slight blackish points on its inner side, excurved below vein 7 and at middle; a terminal series of slight black lunules. Hind wing ochreous white tinged with brown especially on terminal area; a fine dark terminal line; cilia ochreous white; the underside with the costal area irrorated with red-brown, a black discoidal spot, sinuous postmedial line, and terminal series of slight lunules.

*Hab.* N.E. Peru, Huancabamba, 2 ♂ type. *Exp.* 30 mm.

3169 *a*. *Perigea pyrocausta*, sp. n.

♂. Head and tegulæ fiery red with some yellow on vertex of head and at base of tegulæ; palpi red-brown; thorax red-brown mixed with fiery red; pectus, legs, and abdomen red-brown. Fore wing fiery red mixed with yellow, the terminal area suffused with grey-brown, some grey-brown at base of inner margin; subbasal line represented by a faint yellowish bar from costa with point beyond it in cell; antemedial line indistinctly double filled in with yellowish, oblique and slightly sinuous to above inner margin where it is angled; claviform slightly defined by yellow and brown at extremity; orbicular represented by an oblique downcurved yellow lunule defined below by blackish and a yellow and black point above its extremity; reniform with yellow and fiery red centre and yellow annulus defined by brown, constricted at middle; medial line brown, oblique and slightly sinuous to median nervure, then inwardly oblique; postmedial line blackish defined on outer side by grey, bent outwards below costa, oblique to vein 5, then incurved; subterminal line indistinct, red with some yellow on its outer edge towards costa, angled outwards at vein 7 and excurved at middle; a fine black terminal line and pale line at base of cilia. Hind wing whitish suffused with brown; an indistinct dark discoidal bar and traces of a postmedial line; the

underside whitish tinged and irrorated with brown, a large brown discoidal spot and indistinct diffused postmedial line.

*Hab.* W. Colombia, R. Cauca, Guabinas, 1 ♂ type. *Exp.* 28 mm.

3266 *a. Hypoplexia melanica*, sp. n.

♂. Head and thorax fuscous black mixed with some grey; pectus grey; tibiæ irrorated with ochreous, the tarsi ringed with ochreous; abdomen fuscous tinged with grey, the ventral surface grey. Fore wing black with a greyish gloss; basal line black, waved, from costa to submedian fold, some ochreous scales beyond it below the cell; antemedial line black, with ochreous point at costa, waved; claviform defined by black, acute at extremity; orbicular defined by black and with some ochreous scales representing the annulus, rather oblique elliptical; reniform defined by black, with rather punctiform reddish-ochreous annulus and striga in centre, somewhat constricted at middle; medial line curved and slightly sinuous; postmedial line double with some reddish scales on it and reddish striga at costa, bent outwards below costa, then waved, incurved below vein 4, some reddish points beyond it on costa; subterminal line black, crenulate, with dentate black marks before it and streaks beyond it in the interspaces; a terminal series of minute whitish points. Hind wing white, the terminal area fuscous narrowing to a point at tornus; cilia whitish towards tornus; the underside with the costal area slightly irrorated with fuscous, a black discoidal point.

*Hab.* Transvaal, White R. (*Cooke*), 1 ♂ type. *Exp.* 40 mm.

3437 *a. Eriopus thermochroa*, sp. n.

♂. Head and thorax rufous mixed with ochreous, the tegulæ with some black scales, tarsi black with pale rings; abdomen red-brown with pale rings, the ventral surface rufous. Fore wing rufous mixed with some ochreous and irrorated with black; subbasal line black, oblique, sinuous, ending at the antemedial line at vein 1; antemedial line double, black filled in with ochreous, minutely waved; claviform small, defined by black; orbicular with ochreous annulus defined by black, round; reniform incompletely defined by black; a medial black striga from costa and an oblique minutely waved line from lower angle of cell to inner margin; postmedial line double, black filled in with ochreous, with a small black spot at costa, bent outwards below costa,

then with small black lunules on its inner edge, incurved at discal fold, incurved and waved below vein 4, some whitish points beyond it on costa ; subterminal line double, blackish, waved, incurved at discal fold and below vein 4; a diffused dark mark at middle of terminal area and a series of black striæ just before termen defined on inner side by white. Hind wing cupreous red-brown, the cilia with a whitish line at base and whitish tips ; the underside whitish irrorated with brown, a small brown discoidal lunule and crenulate postmedial line incurved below vein 3.

*Hab.* S. Nigeria, Ilesha (*Humphrey*), 1 ♂ type. *Exp.* 26 mm.

3437 *b. Eriopus nana,* sp. n.

♀. Head and thorax red-brown mixed with some ochreous ; pectus and legs with more ochreous, the tibiæ and tarsi with dark brown and ochreous bands ; abdomen fuscous brown with pale rings, the crests ochreous and rufous, the ventral surface whitish. Fore wing dark red-brown mixed with some greyish ochreous ; subbasal line double filled in with whitish, waved, from costa to vein 1 ; antemedial line double filled in with whitish, sinuous, a white spot before it above vein 1 ; orbicular an oblique pale bar with black point in centre ; reniform pale with black striga in centre, constricted at middle ; postmedial line double filled in with whitish, bent outwards below costa, incurved at discal fold and below vein 4, slightly excurved at vein 1, some white points beyond it on costa ; traces of a waved whitish subterminal line with a series of rather lunulate dark patches before it, an oblique white dash beyond it above vein 4 ; a terminal series of small black spots defined on inner side slightly by white. Hind wing dark cupreous brown ; cilia with a fine whitish line at base and whitish tips ; the underside grey-white irrorated and suffused with brown, a brown discoidal lunule, curved postmedial line slightly defined on outer side by whitish, and terminal series of slight dark lunules.

*Hab.* S. Nigeria, Ilesha (*Humphrey*), 1 ♂ type. *Exp.* 22 mm.

3438 *a. Eriopus cyanopera,* sp. n.

♀. Head and thorax purplish red-brown mixed with some ochreous ; palpi in front and lower part of frons whitish ; tarsi ringed with white ; abdomen red-brown, the dorsal crests dark brown and white at tips, the ventral surface purplish red-brown irrorated with ochreous. Fore wing

pinkish red mixed with ochreous, thickly irrorated and in parts suffused with dark brown, the apical area irrorated with blue-white ; subbasal line reddish ochreous with black striæ before it from costa and cell, dentate, from costa to submedian fold ; antemedial line reddish ochreous defined on outer side by slight black marks, angled outwards below costa, then sinuous, bent inwards to inner margin ; orbicular represented by an oblique ochreous and blackish streak to inner edge of reniform which is faintly defined by reddish ochreous and black and with black bar in upper part of centre, narrow above, expanding below and with white point at lower extremity ; a diffused oblique sinuous blackish line from beyond lower angle of cell to inner margin ; postmedial line black defined on outer side by ochreous, minutely waved, oblique to vein 4, then inwardly oblique and angled inwards above vein 1 ; a dark patch on postmedial costal area with some white points on costa ; subterminal line white and dentate towards costa and with oblique white streak before it above vein 6, then ochreous defined on inner side by black, angled inwards at discal fold to near postmedial line, then represented by slight dentate marks ; a terminal series of small black lunules defined on inner side by bluish white. Hind wing red-brown, the cilia chequered with whitish ; the underside bluish white irrorated with dark brown, a small discoidal lunule with white centre, postmedial line bent outwards below costa, then minutely crenulate, and terminal series of small black lunules.

*Hab.* S. Nigeria, Ilesha (*Humphrey*), 1 ♀ type. *Exp.* 36 mm.

3508 *a*. *Bryophila fulvifusa*, sp. n.

♂. Head and tegulæ creamy white mixed with fuscous ; thorax rufous and fuscous mixed ; pectus and legs creamy white, the tarsi blackish ringed with white ; abdomen fuscous ringed with whitish, the ventral surface and anal tuft ochreous white. Fore wing grey thickly irrorated and suffused with fuscous, the basal inner area mostly fulvous orange ; subbasal line represented by a blackish striga from costa ; antemedial line indistinct, blackish, slightly sinuous, oblique from costa to just below the cell, then erect ; orbicular and reniform fulvous-orange, ill-defined, a blackish mark between them ; postmedial line indistinct, blackish, strongly bent outwards below costa, then minutely waved, strongly angled inwards in submedian fold, then bent outwards, a patch of fulvous-orange suffusion beyond it in

submedian interspace and some pale points on costa; subterminal line indistinct, blackish, slightly angled outwards at vein 7 and excurved at middle; the terminal area with some fulvous-orange suffusion. Hind wing white tinged with reddish brown, the cilia white at tips; the underside white with small blackish discoidal spot, indistinct curved postmedial line from costa to vein 2, and slight diffused subterminal shade.

*Hab.* Transvaal, Johannesburg (*Cooke*), 1 ♂ type. *Exp.* 24 mm.

3579 *a*. *Neophænis catocala*, sp. n.

♂. Head and thorax green; pectus and legs whitish and yellow, the fore tibiæ with black streak, the tarsi ringed black and white; abdomen yellow tinged with brown, the crests tipped with black. Fore wing yellow-green slightly tinged in parts with pale brown; subbasal line double, blackish, excurved below costa and ending in a short streak above vein 1; antemedial line double, black, waved, incurved in cell; claviform slightly defined by black at extremity; orbicular defined by black at sides only; reniform incompletely defined by black, large and extending to well below the cell; an indistinct sinuous medial line; postmedial line double, black, bent outwards below costa, then oblique to discal fold where there is a black streak from it to termen, below vein 4 incurved and somewhat dentate, some black points beyond it on costa; subterminal line whitish defined on inner side by black-brown spots, slightly waved, angled inwards at vein 5, a blackish spot beyond it below vein 4; a waved black terminal line; cilia blackish at tips. Hind wing pale yellow, the basal half suffused with brown; a black medial line angled outwards at discal fold, defined on outer side by a yellow band; a black subterminal band expanding into a large apical patch and emitting streaks to termen below veins 4 and 2; cilia yellow with patches of black towards apex and at middle; the underside with blackish discoidal bar with pale striga on it, the medial line slighter and somewhat crenulate.

*Hab.* Brazil, Rio Janeiro, 1 ♂ type. *Exp.* 44 mm.

3616 *a*. *Thalatha occidens*, sp. n.

♂. Head, thorax, and abdomen white mixed with reddish ochreous; tegulæ with faint brown line at middle and prominent line near tips; patagia with some black scales near upper edge; palpi blackish at sides; antennæ brown. Fore

wing white mixed with reddish ochreous; slight pale rufous subbasal and antemedial marks on costa; a sinuous black streak below the cell defined above by white, to the whitish antemedial line which is slightly sinuous and defined on each side by black scales from cell to inner margin; orbicular and reniform white slightly defined by reddish ochreous, the former with reddish-ochreous point in centre, round, a quadrate brown spot between them; postmedial line white defined by black scales, formed by dentate marks and excurved to vein 3, then bent inwards to below end of cell, angled outwards at vein 1 and inwards above inner margin, an oblique white striga beyond it from vein 3 to tornus; a very ill-defined waved white subterminal line from costa to vein 3; a terminal series of black points defined by white lunules; cilia chequered white and rufous. Hind wing whitish suffused with ochreous brown; the underside white tinged with ochreous, the costal area irrorated with a few black scales, a black discoidal spot and crenulate postmedial line excurved from below costa to vein 4.

*Hab.* S. Nigeria, Ilesha (*Humphrey*), 1 ♂ type. *Exp.* 36 mm.

3641 *a. Acronycta transvalica*, sp. n.

♂. Head and thorax white mixed with black-brown; patagia edged with black; pectus white; legs tinged with rufous, the tarsi banded with blackish; abdomen white dorsally tinged with brown, the basal crest tipped with black. Fore wing grey-white irrorated and in parts suffused with reddish brown; a strong black streak below the cell from base to antemedial line, giving off a slight spur below at middle; subbasal line represented by double blackish striæ from costa; antemedial line double, excurved below costa, oblique and waved below submedian fold; orbicular defined by black, round; reniform tinged with rufous and slightly defined by black at sides; medial line black, oblique to median nervure, then slightly angled inwards and outwards at vein 1, some dark suffusion beyond it; postmedial line double, strongly bent outwards below costa, then minutely dentate, excurved to vein 4, then strongly incurved to near medial line, an oblique black streak from just before it in submedian fold to near termen, some dark suffusion beyond it on costal area and white points on costa; a blackish mark just before termen in discal fold and oblique striga in submedian fold; a terminal series of small blackish spots; cilia chequered white and blackish. Hind wing pure white; the

underside with blackish striga from middle of costa and obliquely placed blackish postmedial spots on and below costa.

*Hab.* Transvaal, Barberton, Noord Kaap (*Jeffery*), 1 ♂ type. *Exp.* 28 mm.

4020 *a*. *Athetis strigata*, sp. n.

♀. Head and thorax ochreous white with some brown scales especially on tegulæ; palpi blackish at sides; antennæ black; prothorax with small black spot; tarsi brownish with pale rings; abdomen whitish irrorated with brown except at base and on ventral surface. Fore wing ochreous white irrorated with brown, forming diffused streaks in the interspaces except on costal area, the terminal area suffused with brown; a subbasal blackish point on costa; traces of an oblique sinuous antemedial line; a medial brownish spot on costa and traces of an oblique line from lower angle of cell to inner margin; postmedial line with brownish spot at costa, bent outwards below costa, then excurved and minutely waved, defining the inner edge of the dark terminal area; a terminal series of black points. Hind wing pure white; a slight brownish terminal line from apex to vein 2; the underside with the costal area slightly irrorated with brown.

*Hab.* Br. E. Africa (*Coryndon*), 1 ♀ type. *Exp.* 30 mm.

4020 *b*. *Athetis poliophæa*, sp. n.

♀. Head, thorax, and abdomen grey-brown, the pectus and ventral surface of abdomen whiter. Fore wing grey-brown, the terminal area cupreous brown except towards apex, the costal area slightly irrorated with white; traces of a sinuous dark antemedial line; a curved blackish medial line; postmedial line indistinct, minutely dentate, excurved to vein 4, then incurved, some whitish points beyond it on costa; two slight subterminal white spots below costa; a terminal series of black points with white points before them. Hind wing fuscous brown; the cilia whitish with a dark line at base; the underside brown thickly irrorated with white.

*Hab.* W. Colombia, R. Dagua, Naranjito, 1 ♀ type. *Exp.* 34 mm.

4061 *a*. *Ariathisa nyctimesa*, sp. n.

♂. Head and thorax bluish grey irrorated with fuscous; palpi black, white at tips; lower part of frons white, the

upper part black; antennæ black; basal half of tegulæ brown with black lines near base and at middle; outer half of patagia black; metathorax with paired black patches; pectus and legs black-brown and whitish, the tarsi black ringed with white; abdomen white irrorated with brown. Fore wing blue-grey tinged in parts with brown, the costal half suffused with black-brown to subterminal line, the postmedial area darker, the terminal area clear blue-grey; a slight black streak in base of submedian fold; subbasal line double, black filled in with whitish, waved, from costa to submedian fold; antemedial line double, blackish filled in with whitish, waved, acutely angled outwards in submedian fold to the postmedial line; orbicular and reniform grey defined by black, the former small, round, the latter produced at lower extremity, with black striga in centre and its lower part filled in with black, a patch of blackish suffusion between them; postmedial line indistinctly double filled in with whitish, bent outwards below costa, then dentate and produced to black and white points on the veins, some white points beyond it on costa; subterminal line represented by the contrast between the postmedial and terminal areas and defined on inner side by black streaks at middle, slightly angled outwards at veins 7, 6; a terminal series of black striæ. Hind wing white, the apical area slightly tinged with brown; the underside with the costal and terminal areas sparsely irrorated with fuscous, the apical area suffused with fuscous, a small black discoidal lunule and traces of a postmedial series of points on the veins.

*Hab.* W. Australia, Waroona (*Berthoud*), 1 ♂ type. *Exp.* 36 mm.

4100 *a*. *Ethiopica exolivia*, sp. n.

♂. Head and thorax purplish red mixed with some white; pectus with more white; tarsi pale brownish ringed with white; abdomen white tinged with ochreous, some purplish red at base of dorsum, the ventral surface purplish red. Fore wing purplish red slightly irrorated with whitish, the terminal area yellowish olive; slight sinuous whitish subbasal and antemedial lines from costa to submedian fold; orbicular and reniform defined by whitish, the former round, the latter rather constricted at middle and with whitish patch at middle of outer side; postmedial line slight, whitish, strongly bent outwards and obsolescent below costa, then slightly waved and excurved at middle, some white points beyond it on costa; a slight waved whitish subterminal line, incurved at discal fold and below vein 3; a

terminal series of minute white points. Hind wing pure white; the underside with the costal area tinged with purplish red.

*Hab.* N. Nigeria, Bauchi Prov., Kabwir (*Fox*), 3 ♂ type. *Exp.* 30 mm.

4106 *a. Paromphale chionephra,* sp. n.

♂. Head and thorax fuscous tinged with grey, the back of head and tegulæ rufous; palpi rufous with some fuscous at side of second joint; pectus and legs white tinged with rufous, the tibiæ and tarsi blackish ringed with white; abdomen white tinged with rufous, dorsally irrorated with brown. Fore wing glossy grey tinged with fuscous; the base of costal area black; antemedial line black slightly angled outwards below costa, then sinuous; orbicular a white point defined by black, the reniform a small white spot with some black before and beyond it; postmedial line black, bent outwards below costa, slightly incurved at discal fold, oblique below vein 4 and slightly excurved at vein 1, some white points beyond it on costa; subterminal line defined by a blackish shade before it, slightly angled outwards at vein 7 and excurved at middle; a terminal blackish line. Hind wing whitish suffused with fuscous brown; cilia white at tips except at apex; the underside white tinged with brown, the costal area irrorated with brown, a slight discoidal spot, indistinct curved postmedial line and a terminal line.

*Hab.* Rhodesia, Zambesi, Victoria Falls (*Longstaff*), 1 ♂ type. *Exp.* 18 mm. Cotypes in Mus. Oxon.

4305 *a. Neostrotia mediopallens,* sp. n.

♀. Head and thorax dark red-brown; abdomen red-brown with pale segmental lines, the ventral surface whitish tinged with rufous. Fore wing with the base deep red-brown, its outer edge oblique and sinuous; the broad medial area whitish tinged with ochreous; faint traces of a curved rufous antemedial line with a dark point on it in submedian fold; orbicular a small fuscous spot, the reniform a slight lunule with black points at its upper and lower extremities; a very indistinct pale rufous medial line, bent outwards below costa, then sinuous; postmedial line double, dark red-brown slightly filled in with ochreous and somewhat incurved below vein 5, the area beyond it red-brown with an ochreous apical patch, traces of a subterminal series of ochreous points and a slight ochreous patch on termen

above tornus; a fine dark terminal line and pale line at base of cilia. Hind wing white; a small blackish discoidal spot; traces of a sinuous postmedial line; the apical area with some dark irroration; a terminal series of black striæ; the underside with the costal area and terminal area to vein 3 ochreous irrorated with brown, a black discoidal spot, minutely waved postmedial line from costa to vein 2 with a brown patch beyond it on costa, and terminal series of black striæ.

*Hab.* Colombia, San Antonio (*Palmer*), 1 ♀ type. *Exp.* 20 mm.

4817 *a. Callyna holophæa,* sp. n.

♀. Head and thorax black-brown; pectus greyish; tarsi ringed with white; abdomen fuscous tinged with grey. Fore wing black-brown; a subbasal grey striga from costa; antemedial line very indistinct, black, oblique, sinuous, with some grey irroration at costa; claviform small, defined by black above; orbicular minute, grey defined by black, round; reniform with greyish annulus defined by black, strongly constricted at middle; a faint oblique line from lower angle of cell to inner margin; postmedial line very indistinct, black defined on outer side by grey towards costa, bent outwards below costa to just beyond the reniform, then minutely dentate; four white points on terminal part of costa; subterminal line indistinct, dark, excurved below vein 7 and at middle; a fine blackish terminal line and slight pale line at base of cilia. Hind wing fuscous with a fine blackish terminal line and pale line at base of cilia; the underside grey thickly irrorated with fuscous, the terminal area suffused with fuscous, a faint discoidal spot and traces of a postmedial line.

*Hab.* N. Nigeria, Bauchi Prov., Panyam (*Fox*), 1 ♀ type. *Exp.* 30 mm.

Genus Prolymnia, nov.

Type, *P. viola.*

Proboscis fully developed; palpi upturned, the second joint reaching to vertex of head and slenderly scaled, the third moderate, oblique; frons smooth with tuft of hair above; eyes large, round; antennæ of male serrate and fasciculate, the shaft thickened at base, the apical third ciliated; thorax clothed with hair and scales mixed, the pro- and metathorax with spreading crests, tibiæ slightly fringed with hair; abdomen with dorsal crests on two basal segments. Fore

wing with the apex rounded, the termen evenly curved and not crenulate; veins 3 and 5 from near angle of cell; 6 from below upper angle; 7 from angle; 8, 9, 10 stalked; 11 from cell. Hind wing with veins 3, 4 from angle of cell; 5 obsolescent from well below middle of discocellulars; 6, 7 from upper angle; 8 anastomosing with the cell near base only.

4533 *a*. *Prolymnia viola*, sp. n.

♂. Head, thorax, and abdomen brown mixed with grey. Fore wing violaceous brown mixed with grey, the basal area greyer; an oblique subbasal grey line from costa to vein 1 followed by a violaceous brown patch below subcostal nervure defined on outer side by a grey line; antemedial line grey, acutely angled outwards below costa, then obliquely incurved; reniform figure-of-eight-shaped, defined by whitish; postmedial line slight, grey, arising at discal fold in which it is bent outwards as a streak, oblique to vein 2, then obliquely incurved; a dark violaceous patch defined by whitish on costa before the subterminal line, quadrate with oblique inner edge; subterminal line greyish, strongly incurved below vein 6 and ending on termen above tornus; the termen dark defined on inner side by a fine whitish line. Hind wing grey-brown, the cilia whitish at tips towards tornus; the underside greyer.

*Hab.* Gold Coast, Kumasi (*Whiteside*), 1 ♂ type. *Exp.* 30 mm.

4533 *b*. *Prolymnia atrifera*, sp. n.

♀. Head, thorax, and abdomen brown mixed with grey. Fore wing grey tinged and thickly irrorated with brown; subbasal line grey, erect, from costa to vein 1; antemedial line grey, oblique, bent inwards to costa, another line just before it at costa to submedian fold towards which it diverges; reniform elliptical, slightly defined by grey and with a lunulate black-brown patch on its inner side arising from costa; a grey line from lower angle of cell to inner margin; a diffused blackish fascia from lower angle of cell to subterminal line, before which there is a black-brown patch defined by grey from costa to vein 6, quadrate with oblique inner edge; subterminal line grey, strongly incurved below vein 6 and ending on termen above tornus; a terminal series of black striæ defined on inner side by a fine waved whitish line. Hind wing fuscous brown, the cilia greyer; the underside grey tinged and thickly irrorated

with brown, a brown discoidal point and indistinct curved postmedial line.

*Hab.* S. Nigeria, Lagos, Ebute Meta (*Boag*), 1 ♀ type. *Exp.* 32 mm.

*Erastrianæ.*

5003 *a. Acidaliodes costipuncta*, sp. n.

Head, thorax, and abdomen white mixed with brown, the pectus and legs whiter. Fore wing whitish suffused with red-brown ; subbasal and antemedial black points on costa ; small blackish spots at middle of cell and on discocellulars ; a medial black point on costa and indistinct diffused brown line from it to inner margin ; the terminal half of costa with prominent series of small brown spots ; an indistinct dark postmedial line, angled outwards at vein 6 and incurved below vein 4, the area from just beyond it suffused with dark brown ; a slight whitish subterminal line, angled outward below apex, minutely dentate at middle and angled inwards in submedian fold ; a terminal series of blackish striæ. Hind wing whitish suffused with red-brown except towards base ; a slight brown discoidal striga ; an indistinct sinuous postmedial line defined on outer side by whitish ; a subterminal series of small whitish lunules and a terminal series of dark striæ ; the underside whitish, the terminal area suffused with brown, a small blackish discoidal spot and diffused sinuous brown postmedial line.

*Hab.* Peru, Cuzco Mts. (*Garlepp*), 1 ♂, 1 ♀ type. *Exp.* 16 mm.

5020 *a. Anablemma diagramma*, sp. n.

Fore wing with the termen angled at vein 6, then oblique ; hind wing with veins 3, 4 and 6, 7 stalked, 8 anastomosing with the cell to beyond middle.

♀. Head, thorax, and abdomen grey-white slightly tinged with rufous ; palpi and frons black-brown ; fore and mid legs suffused with brown. Fore wing grey-white tinged with rufous and striated with brown ; an oblique blackish antemedial striga from costa ; an oblique black postmedial line from vein 2 to inner margin ; the termen with small black spots from apex to vein 4. Hind wing grey-white tinged with brown and slightly irrorated with dark brown ; a terminal series of dark points from apex to vein 2 ; the underside white, the costal and terminal areas slightly irrorated with blackish, a slight blackish discoidal lunule, curved

sinuous postmedial line and series of small black spots on termen from apex to vein 2.

*Hab.* Brazil, Rio Janeiro (*Wilson*), 1 ♀ type. *Exp.* 28 mm.

Genus Alypophanes.

| | Type. |
|---|---|
| *Alypophanes*, Turner, Tr. R. Soc. S. Austr. xxxii. p. 63 (1908) | *iridicosma.* |

5310 *a*. *Alypophanes flavirosea*, sp. n.

♀. Head yellow with crimson band behind; palpi with the second joint brown towards extremity, the third white; thorax and abdomen bright rose-pink, the latter with white spot at base of dorsum and the anal tuft yellow; pectus, legs, and ventral surface of abdomen white. Fore wing bright rose-pink; a yellow subbasal band, not reaching costa and expanding towards inner margin; a medial yellow band expanding towards costa and inner margin; the termen narrowly and cilia yellow. Hind wing bright rose-pink; an oblique yellow medial band expanding into a rounded patch beyond the cell and bent inwards below submedian fold to above tornus; cilia yellow.

*Hab.* Solomon Is., Bougainville (*Meek*), 1 ♀ type. *Exp.* 12 mm.

5310 *b*. *Alypophanes phœnicoxantha*, sp. n.

♀. Head yellow with crimson band behind; palpi with the second joint brownish towards extremity; antennæ with the shaft brown except towards tips; thorax and abdomen purplish pink, the latter with pure white spot at base of dorsum and the anal tuft yellow; pectus, legs, and ventral surface of abdomen white, the fore tibiæ brown on inner side. Fore wing yellow; a purplish-pink patch at base with sinuous outer edge; a rounded purplish-pink antemedial patch from costa to vein 1, with a yellow streak on it on costa, edged at sides with blackish, and with its lower edge rather excised; the terminal area with large elliptical purplish-pink patch from costa to tornus, its inner edge slightly excised at middle and defined by blackish, its outer edge sinuous and leaving some yellow on termen from apex to vein 4; cilia yellow. Hind wing purplish pink, the inner area pale; the costal area yellow; a rounded yellow patch beyond the cell conjoined to the costal area and giving off an oblique striga from its lower edge to vein 2; a narrow

yellow terminal band indented by a pink tooth running out to termen at vein 3; cilia yellow.

*Hab.* Br. N. Guinea, Milne Bay (*Meek*), 1 ♀ type. *Exp.* 18 mm.

Genus Eugatha, nov.

Type, *E. thermochroa.*

Proboscis rather slight; palpi with the second joint obliquely porrect and broadly fringed with hair above, the third short, porrect; frons smooth, with tuft of hair; eyes large, round; antennæ of male somewhat laminate and almost simple; thorax clothed almost entirely with scales, the metathorax with depressed crest; tibiæ fringed with long hair; abdomen with large basal crest. Fore wing with the apex rounded, the termen evenly curved and not crenulate; veins 3 and 5 from near angle of cell; 6 from upper angle; 9 from 10 anastomosing with 8 to form the areole; 11 from cell. Hind wing with veins 3, 4 from angle of cell; 5 nearly fully developed from well above angle; 6, 7 from upper angle; 8 anastomosing with the cell near base only.

5429 *a. Eugatha thermochroa,* sp. n.

♂. Head and thorax bright rufous mixed with red-brown; antennæ with the basal joint whitish in front; abdomen rufous, the sides and ventral surface towards base whitish, the basal crest red-brown. Fore wing bright rufous slightly irrorated with red-brown, the terminal area tinged with purplish, the termen violaceous white, the veins streaked with red-brown; a slight waved red-brown subbasal line from costa to vein 1; antemedial line double, red-brown, angled outwards to near upper angle of cell, then oblique; a rather diffused blackish spot at lower angle of cell with an oblique red-brown line from it to inner margin; postmedial line double, red-brown, oblique from costa to vein 6, slightly incurved at discal fold, oblique below vein 4; some chocolate-brown on costa before the oblique red-brown subterminal line which is slightly excurved at middle; a series of black-brown striæ just before termen. Hind wing creamy-white, the terminal area suffused with red-brown; cilia white tinged with rufous; the underside with the costal and terminal areas irrorated with rufous, a red-brown discoidal spot, curved postmedial line and fine terminal line.

*Hab.* Dutch N. Guinea, Fak-fak (*Pratt*), 1 ♂ type. *Exp.* 22 mm.

6077 *a*. *Hoplotarache nephele*, sp. n.

♀. Head and thorax white, the latter with some grey on dorsum; antennæ fulvous brown with a black point between their bases; pectus and legs white, the fore femora above and tarsi tinged with brown; abdomen grey-brown with white segmental lines, the ventral surface white. Fore wing white suffused with grey and olive-brown except on costal area to subterminal line, basal half of inner area, and terminal area except at apex; the costa with oblique antemedial and medial grey and olive bars and a postmedial spot, the inner margin with white antemedial striga defined on each side by grey patches; orbicular and reniform grey with white annuli, round; a wedge-shaped white medial patch from submedian fold to inner margin; postmedial line olive-brown slightly defined on outer side by whitish from the costal area to inner margin and incurved below vein 4; the white terminal area with sinuous inner edge, excurved at middle and bent outwards to tornus; black bars on termen at discal and submedial folds with two slight spots between them, the cilia fuscous beyond the discal bar. Hind wing white tinged with brown, the terminal area suffused with brown; cilia white mixed with brownish; the underside white, a slight dark discoidal lunule, the terminal area suffused with brown from apex to vein 2.

*Hab.* Germ. E. Africa, Usagara Distr., Kilossa (*Neave*), 1 ♀ type. *Exp.* 30 mm.

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LVI. — *Descriptions of new Species of African Diploptera in the Collection of the British Museum.* By Geoffrey Meade-Waldo, M.A.

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The majority of the new species described in the present paper were received from the Entomological Research Committee (Tropical Africa).

All the types are in the British Museum Collection.

All measurements of length are from the front of the head to the apex of the second abdominal segment.

Masaridæ, Leach.

Masaris, F.

*Masaris vespiformis*, F.

This interesting insect seems to have been the subject of

a considerable difference of opinion about the time when Henri de Saussure was working at his invaluable 'Études sur les Vespides.' At a meeting of the Entomological Society of France (January 26th, 1853), M. E. Blanchard exhibited the male *Masaris vespiformis* which had served as the actual type of Fabricius, and was preserved in the Paris Museum (Bull. Soc. Ent. Fr. p. vi, 1853).

This specimen was collected in Barbary by the botanist Desfontaines. Grave doubts as to the correct identification of *Masaris* existed among those who had not been able to examine the Fabrician type, and for this reason M. Blanchard asked the Society to appoint three of its members to inquire into the matter. Messieurs Goureau, L. Fairmaire, and Guérin-Méneville were appointed for this purpose. At a later meeting M. Léon Fairmaire made it the subject of a special report, which was afterwards criticised by Saussure.

Dr. Schaum, who held different views on *Masaris* as understood by Fabricius, Latreille, and Blanchard, wrote fully on the subject (Ann. Soc. Ent. Fr. (3) i. p. 653, pl. 20. fig. 1, ♂ ♀, 1853). There can be no doubt that the insect figured by Schaum as *M. vespiformis*, F., is not the typical form described by Fabricius from Barbary, but a new subspecies from Egypt, which it is intended to describe below. Observations on the fine series of *M. vespiformis* from Morocco, collected by Escalera and now in the British Museum (Ann. & Mag. Nat. Hist. (8) vii. p. 113, 1911), laid the foundation to an enquiry, and it was seen that whereas the two tubercles on abdominal sternites 2 and 3 were markedly different in both shape and height in the Moorish males, the males from Egypt possessed tubercles differing only in a slight disparity in height and shape of apex.

The Vicomte R. du Buysson was kind enough to compare one of the Moorish males with the Fabrician type in Paris. In his opinion the characters which differentiate the two insects could not be considered more than racial or varietal. Du Buysson says :—" Le type mâle de Fabricius est parfaitement conforme à la planche de l'ouvrage de Saussure (Ét. Fam. Vesp. iii. pl. v. fig. 4), c'est à dire que le 2e sternite abdominal porte une sorte de tubercule carèné, tronqué obliquement dans le sens antéro-postérieur, tandis que le troisième sternite porte une protubérance semblable à l'exemplaire du Maroc, que vous m'envoyez, . . . . . Le type de Fabricius est en outre *jaune pâle* dans ses ornements clairs ; ces ornements sur celui du Maroc sont beaucoup plus blanchâtres. Avec la forme du tubercule du 2e sternite, je

ne vois pas d'autre différence entre le type de Fabricius et votre exemplaire du Maroc."

An outline drawing of the second and third abdominal sternites, drawn from the type by Vicomte du Buysson, is here reproduced. With regard to the females, it is impossible to find any difference but colour between specimens from Palastine (Jericho), in the British Museum, and the Moorish females. These latter differ to a considerable degree, from specimens with the abdominal fasciæ and the whole prothorax ferruginous, to specimens with the anterior margin of the pronotum and the abdominal markings of a pale whitish yellow.

Fig. 1.

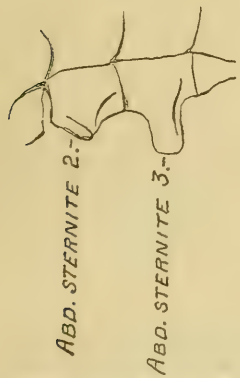
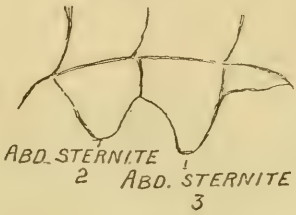



Fig. 2.




Sternites 2 and 3 of *Masaris*, seen in profile, greatly enlarged.
Fig. 1.—*Masaris vespiformis*, F. Type. 1793.
Fig. 2.—*Masaris vespiformis*, F., subsp. *ægyptiacus*, M.-Waldo. Type. 1911.

The Vicomte du Buysson says that there is no difference but colour between the females he has examined from Egypt and the specimen from Morocco. He adds, however, that in Egyptian females the base of abdominal tergites 2, 3, 4 is feebly but visibly depressed, whereas in the Moorish specimen the base of tergite 2 alone is depressed. No specimens of Egyptian females being available for examination, it has been impossible to record a personal verification of this, but in the females from Jericho, which are doubtless the females of *ægyptiacus*, the base of tergite 2 alone is depressed.

*Masaris vespiformis*, F., subsp. *ægyptiacus*, subsp. n.

♂. Niger; clypeo, facie, pronoto segmentis abdominalibus 1–6 apice, tibiis tarsisque flavis. Segmentis abdominalibus 2–3 infra tuberculis duobus subæqualibus armatis.

Black ; the clypeus, an interrupted lateral line on antennæ, the front, a narrow line behind the the eyes, pronotum, tegulæ, a small spot on the apex of the scutellum, broad yellow fasciæ on the apical margin of abdominal segments 1–6, those on segments 2, 3, 4 narrowly broken on the medio-dorsal surface, golden yellow. A small round spot on each side of sternite 4, the apex of the femora, the tibiæ and tarsi of the anterior legs, and tibiæ and tarsi of intermediate and posterior legs for the most part golden yellow.

Apical joints of tarsi and tubercles on abdominal sternites 2 and 3 ferruginous. Clypeus as broad as long, shallowly emarginate at apex, a blunt tubercle on front between base of antennæ. Tubercles on abdominal sternites 2 and 3 similar in structure, that on sternite 2 rather less prominent than that on sternite 3, which is slightly truncate at apex.

Length 8½ mm.

*Hab.* Cairo, Egypt (*F. D. Morice*, 4. iv. 99).

This specimen was in the collection of the late Edward Saunders, to whom it was presented by the Rev. F. D. Morice, and in whose collection there are further specimens.

The following should facilitate the differentiation of the new subspecies from typical *Masaris vespiformis*, F. :—

| *Masaris vespiformis*, F., subsp. *ægyptiacus*, subsp. n. | *M. vespiformis*, F. |
|---|---|
| Black and golden yellow. | Black and pale or whitish yellow. |
| Mesothorax totally black, minute yellow spot at tip of scutellum. | "Thorax dorso niger, macula media antice emarginata, flava. Margo et scutellum flava." (Ent. Syst. ii. p. 284.) |
| Clypeus entirely yellow. | "Clypeus emarginatus flavus, margine tenui nigro." (Lepel. Hist. Nat. Ins. ii. p. 589.) |
| Median segment black. | Median segment with angles of truncation yellow. |
| Small tubercle on inter-antennal space. | No tubercle on inter-antennal space. |

### Jugurtia, Sauss.

### *Jugurtia simpsoni*, sp. n.

Niger, flavo variegatus ; alis hyalinis.

♀. Black ; the scape beneath, clypeus except the base, two large subquadrate marks on the front, continuing round the sinus of the eyes, a line behind the eyes, anterior margin of pronotum, its posterior margin along the hinder half, the tegulæ posteriorly, a small mark on the disk of the

mesonotum posteriorly, the apex of the scutellum, the post-scutellum, two approximated ovate marks on mesopleuræ (the upper large, the lower minute), the truncation of the median segment laterally, pale yellow.

All the abdominal tergites with apical fasciæ widening laterally, those on tergites 2–5 dilating medially, and sternites 1–5 at the extreme apex, pale yellow. Legs pale yellow, except the coxæ and femora, which are black.

Mandibles, flagellum, and tegulæ anteriorly ferruginous.

Wings clear hyaline.

Clypeus deeply emarginate at apex, broader than long. Head and thorax somewhat coarsely, abdomen more finely, punctured; truncation of median segment finely longitudinally striate.

Length 7 mm.

*Hab.* Patchari (22. iii. 1911) and N'jau (15. iii. 1911), Gambia; 3 ♀.

Presented by the Entomological Research Committee (Tropical Africa). This is the first species of *Jugurtia* received from south of the Sahara, but it nevertheless strongly resembles the Palæarctic species of the genus, from which it has been found difficult to separate it.

*J. simpsoni* can be distinguished from the nearly allied species as follows :—

| | |
|---|---|
| A. Surface of truncation of median segment usually entirely yellow, occasionally with black pipe-shaped marks, as in type specimen ..... | *J. escalerœ*, M.-Waldo. |
| B. Surface of truncation of median segment black, yellow laterally. | |
| *a*. Legs and antennæ entirely yellow .... | *J. numida*, Sauss. |
| *b*. Legs not entirely yellow, antennæ black or ferruginous. | |
| $a^2$. Flagellum black above, mesopleuræ coarsely punctured ..... | *J. oraniensis*, Sauss. |
| *b*. Flagellum ferruginous, mesopleuræ finely punctured ..... | *J. simpsoni*, sp. n. |

## Rhaphidoglossa, S. S. Saunders.

### *Raphidoglossa punctata*, M.-Waldo.

A long series of this species, consisting of ten males and twenty-seven females, all collected by S. A. Neave from the Lower Luangwa River, N.E. Rhodesia, with the exception of one male from Lufira River, Katanga, shows it to be distinct from *R. natalensis*, Smith. It was suggested (Ann. & Mag. Nat. Hist. (8) v. p. 35, 1910) that *R. punctata*, the male

of which was described from Angola, might prove to be the male of *R. natalensis*, Smith, described from Natal, but the females from N.E. Rhodesia show that this is not the case. The male of *R. natalensis* still remains unknown.

Females of *R. natalensis* and *R. punctata* differ from one another in the following respects :—

| *R. natalensis.* | *R. punctata.* |
|---|---|
| *Petiole* slightly longer than thorax, posterior half widening somewhat abruptly towards apex. Tubercles on sides comparatively prominent. Angles of pronotum more pronounced than in *R. punctata.* | *Petiole* as long as head and thorax combined, widening very gradually towards apex, very slender. Tubercles either absent or very minute. |
| Clypeus black. | Clypeus ferruginous, base yellow. |
| Pronotum black. | Pronotum mostly ferruginous. |

The males of *R. punctata* recently received all have the pronotum more or less ferruginous; in the type specimen there is small trace of this, the hind margin of the pronotum alone bearing a reddish tinge. It is possible that this colour fades, since the type specimen was received at the British Museum in 1873, *i. e.* 37 years before it was described. On the other hand, *R. natalensis* was in all probability described from a fresh specimen, as it was only acquired by the Museum the year preceding the publication of its description, a fact which suggests that it never bore any ferruginous markings.

## Labus, Sauss.

The following key should help in the identification of the newly described forms ; three closely allied species are included for comparison :—

| | |
|---|---|
| A. Postscutellum bispinose ..... | *L. swalei*, sp. n. |
| B. Postscutellum not bispinose. | |
| *a*. Slender insects ; petiole without a spine at base, at least as long as thorax. | |
| $a^2$. Head broader than thorax. | |
| $a^3$. Abdominal segments 1, 2 with yellowish fasciæ, terminal segments black. | |
| $a^4$. Tegulæ black. | |
| $a^5$. Petiole linear ..... | *L. fragilis*, sp. n. |
| $b^5$. Petiole distinctly broader at apex ..... | *L. adelphus*, sp. n. |
| $b^4$. Tegulæ red-ferruginous ..... | *L. annulatus*, M.-Waldo. |
| $b^3$. All the abdominal segments with yellow fasciæ, terminal abdominal segment red-ferruginous .. | *L. maindroni*, Buyss. |

$b^2$. Head no broader than thorax, all the terminal abdominal segments red-ferruginous ..... *L. rothschildanus*, Buyss.

*b*. More robust insects; petiole with a distinct spine at base, shorter than thorax.

$a^2$. Median segment rounded dorsally, 8½ mm. long ..... *L. caffra*, sp. n.

$b^2$. Median segment with a depression on middle of dorsal surface, 7 mm. long ..... *L. gambiensis*, sp. n.

*Labus swalei*, sp. n.

*L. chudeaui* similis, sed major; niger; prothorace, segmentorum 1, 2 abdominis margine postico flavo fasciatis. Alis hyalinis.

♀. Black; clypeus, except a narrow lateral and apical border, scape beneath, pronotum in front, tegulæ, two spots on the scutellum, and narrow fasciæ on the apical margins of abdominal segments 1 and 2, pale yellow.

Apex of femora and tibiæ of all the legs pale yellow. Tarsi testaceous. Petiole laterally and abdominal segments 3–6 obscurely ferruginous.

Clypeus as broad as long, emarginate, narrowly produced towards the apex, sides of the emargination terminated in sharp teeth; head rather broader than thorax; postscutellum bluntly bispinose; median segment convex, the apical angles produced. Petiole slender, rather longer than the thorax, bearing two conspicuous lateral tubercles on the basal third, depressed dorsally and broadest at the apex, when seen in profile the petiole appears truncate anteriorly and smaller posteriorly; abdominal segment 2 rather long, cup-shaped. Punctured, the head (except clypeus), thorax, and second abdominal segment coarsely, remaining abdominal segments minutely. The whole covered with a silvery-grey pubescence, most conspicuous on vertex and median segment.

Length 5½ mm.

♂. Differs from the female in the totally yellow clypeus, and flagellum reddish brown beneath.

*Hab.* The Nubian Desert between Korosko and Abu Hamed (*Dr. Swale*); 2 ♀, 1 ♂.

This species is very near *L. chudeaui*, Du Buyss.

The Vicomte du Buysson has been kind enough to examine a specimen of *L. swalei* and to compare it with that species, from which he considers it to be distinct. *L. swalei* has the clypeus more deeply emarginate and the extremity of the petiole depressed; the petiole is longer and more slender than in *L. chudeaui*, which is also a considerably smaller species.

*Labus adelphus*, sp. n.

*L. fragilis* proxime affinis, sed abdominis petiolo breviore, robustiore.

♂. Black; with the yellow markings exactly as in *L. fragilis* ♂, except that the yellow fascia on abdominal sternite 2 is unbroken. Antennæ (absent in *L. fragilis* ♂) with terminal six joints of flagellum for the most part testaceous beneath.

Wing colour and neuration as in *L. fragilis*. Clypeus subovate, shallowly emarginate at apex; head as broad as thorax at tegulæ.

Petiole less than 3 mm. in length, equal in length to thorax, gradually widening from base to apex, the apex being twice as broad as the base; base of abdominal segment 2 as wide as petiole at apex.

Pubescence as in *L. fragilis*. Whole rather coarsely punctured, abdominal segments 3–7 more finely.

Length 8 mm.

*Hab.* Mabira, Uganda (18. ix. 1910) (*C. C. Gowdey*); 1 ♂.

Presented by the Entomological Research Committee (Tropical Africa).

The species very closely resembles *L. fragilis*, but is easily distinguished from it by its stouter build.

The petiole is totally different, being quite twice as wide at the apex as at the base and not of uniform thickness throughout as in *L. fragilis*. Abdominal segment 2 is not petiolate to the same extent as in *L. fragilis*.

*Labus fragilis*, sp. n.

Niger; abdominis segmentorum 1, 2 margine postico pallide flavis, petiolo longissimo, tenui. Alis cellula radiali præcipue infuscatis.

♀. Black; two minute spots on apex of clypeus, extreme tips of the anterior angles of pronotum, a small spot behind the tegulæ, narrow apical fasciæ on abdominal tergites 1 and 2, abdominal sternite 2 with broadly interrupted fascia, anterior tibiæ in front and a spot on posterior tibiæ, pale yellow. Wings fuscous, especially along the costa and in the radial cell; the second cubital cell subpetiolate.

Clypeus as broad as long, subovate, convex; head massive, broader than thorax; scutellum and postscutellum rounded, median segment rounded, gradually sloping to apex. Petiole of abdomen 3 mm., truncate anteriorly, of uniform width in its whole length, longer than thorax, but not so long as head and thorax together; abdominal segment 2 at base one-half as narrow as petiole at apex, subpetiolate, cup-shaped, about

as wide at apex as the head. Front and clypeus covered with dense silvery pubescence, especially conspicuous on base of clypeus and in the sinus of the eyes.

Punctured; head, thorax, and abdominal segments 1, 2 rather coarsely, the median segment and abdominal segments 3–6 more finely.

Length 8¼ mm.

*Hab.* Lower Luangwa River, N.E. Rhodesia, Sept. 1910, 1600–1800 ft. (*S. A. Neave*), and Bulawayo, Aug. 1909 (*E. C. Chubb*); 1 ♂.

Appears to come nearest to *L.* ? *macrostylus*, Kohl, but differs in the neuration and colour of the legs.

The male has the clypeus entirely yellow.

This species was presented by the Entomological Research Committee (Tropical Africa).

*Labus caffra*, sp. n.

Niger; abdominis segmentorum 1, 2 margine postico flavis; pedibus ferrugineis, flavo variegatis; alis fusco-hyalinis, costa cellulaque radiali infuscatis.

♀. Black; scape beneath, clypeus at the base and two minute spots at apex, a small spot in the sinus of each eye, a spot between the base of the antennæ and behind the eyes, a short interrupted line on the anterior margin of the pronotum, a line on the postscutellum, narrow apical fasciæ on abdominal tergite 1, and abdominal tergite and sternite 1 and 2, pale yellow. Tibiæ above pale yellow.

Mandibles except the base, tegulæ, and legs ferruginous red.

Wings hyaline, darker along the costa and in radial cell.

Head broad, as broad as thorax at tegulæ, clypeus as broad as long, narrowly produced towards apex; thorax massive; pronotum truncate anteriorly, widening towards tegulæ, the lateral angles of the truncation acute, median segment rounded dorsally, gradually sloping posteriorly.

Petiole robust, equal in length to the mesonotum, narrowest and subtruncate at base, gradually widening to apex, the base armed above with an acute spine; second abdominal segment cup-shaped, somewhat elongate.

Head, thorax, and abdominal segments 1–3 covered with deep granular punctures, median segment and terminal abdominal segments very finely punctured.

The whole insect covered with short grey pubescence, most conspicuous on clypeus, pleuræ, and abdomen.

Length 8½ mm.

*Hab.* Zulu; 1 ♀.

*Labus gambiensis*, sp. n.

Niger; abdominis segmentorum 1, 2 margine postico flavis; tibiis flavo variegatis, femoribus tarsisque ferrugineis; alis hyalinis, cellula radiali apicaliter fusca.

♀. Black; the scape beneath, minute spots in sinus of eyes and behind them, two small marks on pronotum in front, two small linear marks on the postscutellum, narrow fasciæ on the apical borders of abdominal tergite 1, and of abdominal tergite and sternite 2, and the tibiæ above, pale yellow.

Legs for the most part ferruginous.

Wings clear hyaline, radial cell in the apical half, and costal cell in the extreme apex, fuscous.

Clypeus convex, subtriangular, as broad as long, the apex slightly emarginate; head as broad as thorax; pronotum truncate anteriorly, gradually widening towards tegulæ, median segment rounded posteriorly, a depression on the dorsal surface of the truncation.

Petiole short, equal in length to disc of mesonotum, widening towards apex, the base armed with a spine; abdominal segment 2 elongate.

Punctured; head, thorax, and abdominal segment 1 coarsely, remaining segments of abdomen finely.

The whole insect covered with grey pubescence, most conspicuous on the clypeus and mesopleuræ.

Length 7 mm.

*Hab.* Duniajoe, Gambia, 24. iv. 1911 (*J. J. Simpson*), and S.W. shore of Lake Nyasa, between Fort Johnston and Monkey Bay, 1650 ft., 25th Feb.–4th March, 1910 (*S. A. Neave*); 2 ♀.

Presented by the Entomological Research Committee (Tropical Africa).

Synagris, Latr.

*Synagris flavomaculata*, sp. n.

Niger; segmentis 3–5 abdominis utrinque flavo maculatis; alis fusco-violaceis; pedibus ferrugineis.

♂. Black; abdominal segments 3–5 with a subquadrate spot on apical margin on each side, pale yellow. Mandibles, clypeus, antennæ, lower portion of postocellar region and the legs, red-ferruginous. Wings brownish, a faint violet effulgence in certain lights. Mandibles 6½ mm. in length, straight and sharp, inner margin finely serratiform, armed at the base with a conspicuous protuberance; clypeus rather

longer than broad, truncate at apex, somewhat convex. Head massive, as broad as thorax at its widest, postorbits swollen; scutellum and postscutellum rather prominent, postscutellum bluntly bilobed; median segment medially depressed, each side forming a ridge terminating in an inconspicuous angle. Abdomen with segment 1 rather narrower than segment 2; sternite 7 armed with a series of short spines.

Clypeus and mandibles minutely, abdomen sparsely, head and thorax coarsely punctured.

The whole clothed with a more or less dense covering of black pubescence, thickest on the ventral surface of the abdomen; legs with golden pubescence.

Length 22 mm.

*Hab.* Lufira River, Katanga (3500 ft.), 1st September, 1907; 150–200 miles W. of Kambove (3500–4500 ft.); N.E. Rhodesia, Fort Jameson (3800 ft.), 3rd–6th June, 1910 (*S. A. Neave*): Fwambo, Tangan Nyassa Plateau, Tanganyika (*W. H. Nutt*).

♀. Similar to the male, but the mandibles shorter (5 mm.) and with clypeus bluntly pointed, not truncate at apex.

This conspicuous species comes into Saussure's Division I., which includes those species with straight mandibles and 3-jointed labial and maxillary palpi. The colour-markings are constant in all the nine specimens available for examination. The only male in the series besides the type specimen has the protuberance at the base of the mandibles only slightly developed.

### Montezumia, Sauss.

### *Montezumia bimaculata*, sp. n.

Niger, nitidus; segmento secundo abdominis utrinque flavo-maculato; alis fusco-cæruleis.

♀. Shining black; a small ovate spot on apical margin of tergite 2 on each side, pale yellow.

Mandibles, scape, underside of flagellum for the most part, a line behind the eyes, apex of anterior femora, anterior tibiæ and tarsi totally, intermediate tibiæ above, and intermediate and posterior calcaria, ferruginous.

Wings dark brown-violaceous, the hind wings apically hyaline. Anterior tibiæ and tarsi densely, and intermediate tibiæ and tarsi more sparingly clothed with golden pubescence. Surface of truncation of median segment clothed with dense silver-grey pubescence, a small ovate patch of dense, short, brown pubescence on abdominal sternite 2.

Clypeus subtriangular, truncate, apical two-thirds traversed by two longitudinal carinæ, a small half-moon-shaped depression on vertex behind the ocelli; thorax massive, pronotum truncate anteriorly, widening towards the tegulæ; basal half of petiole flattened dorsally, apical half concave ventrally, a small tubercle on each side.

Punctured, the clypeus sparsely, otherwise somewhat coarsely; dorsal half of petiole coarsely longitudinally striate, ventrally coarsely rugose.

Length 20 mm.

*Hab.* N.E. Rhodesia, on road Fort Jameson to Lundazi (4000 ft.), 7th–14th June, 1910 (*S. A. Neave*); 1 ♀.

Presented by the Entomological Research Committee (Tropical Africa).

This is the first species of *Montezumia* described from Africa, and is very typical of the genus as defined by Saussure. Any mention of the small pad of pubescence on abdominal sternite 2 seems to have been omitted in Saussure's description of *M. indica*; a similar pad is present in both that species and *M. wallacei*, M.-Waldo.

## Rhynchium, Spin.

### *Rhynchium grayi*, Smith, *neavei*, subsp. n.

Caput thoraxque ferruginei; abdominis segmento secundo fascia magna alba, abdomine nigro (segmento primo excepto); alis obscuris, violaceo micantibus.

♂. Ferruginous; clypeus for the most part, scape beneath, and a broad fascia on apical margin of abdominal segment 2, pale yellow. Abdominal segments 2–7, with exception of abdominal sternite 2, black. Flagellum dark above.

Clypeus subtriangular truncate, twice as long as broad. Shape of thorax and comparative width of abdominal segments as in *R. grayi*. Punctuation coarse, as in *R. grayi*. Wings fusco-hyaline, with a violet effulgence. Second abscissa of the radial cell is ½ as long as the third abscissa, whereas in *R. grayi* it is only ¼ as long.

Length 15½ mm.

*Hab.* Karonga, Nyasaland, 7th–11th July, 1910 (*S. A. Neave*); 2 ♂.

Presented by the Entomological Research Committee (Tropical Africa).

### Odynerus, Latr.

*Odynerus* (*Ancistrocerus*) *gowdeyanus*, sp. n.

Niger; crasse punctatus, abdomine flavo-ochraceo; alis fusco-violaceis.

♂. Black; abdomen, except segment 1 at base, ochraceous yellow. Wings fuscous, with a violaceous effulgence. Clypeus convex, longer than broad, narrowly produced towards the apex, shallowly emarginate, angles of emargination produced and acute.

Thorax: pronotum truncate anteriorly, widening towards the tegulæ; scutellum and postscutellum slightly convex, median segment truncate, the sides of the truncation forming two subacute ridges. *Abdomen* normal, abdominal segment 1 massive.

Punctured; the head, thorax, and the black area at the base of abdominal segment 1 laterally, covered with deep granular punctures, those on the sides of the median segment running into irregular striæ; truncation of median segment finely, transversely striate; abdomen finely punctured. Clypeus and mandibles impunctate.

Clypeus viewed from above covered with dense bronze pubescence; abdomen sparsely pubescent.

Length 11½ mm.

*Hab.* Entebbe, Uganda (*C. C. Gowdey*), 5.ix.1910; 2 ♂.

Presented by the Entomological Research Committee (Tropical Africa).

There is a specimen of this most striking *Odynerus* in the Muséum d'Histoire Naturelle, Paris.

### Pterochilus, Klug.

*Pterochilus cyaneipennis*, André.

*Pterochilus cyaneipennis*, Ed. André, Rev. Ent. Caen, vol. xiv. p. 355 (1895).
*Pterochilus korbi*, Schulz, Hymenopteren-Studien, pp. 48–52 (1905).
*Pterochilus aterrimus*, E. Saunders, Trans. Ent. Soc. Lond. p. 403 (1905).

In a note previously published (Ann. & Mag. Nat. Hist. (8) vii. p. 99, 1911) *P. aterrimus* was synonymized with *P. korbi* on a comparison between the types, which are in the National Collection. There can be no doubt that they are the *Pterochilus cyaneipennis* of Ed. André, with whose description they entirely agree. The type locality of *P. cyaneipennis* is also Biskra.

LVII.—*List of a Collection of Mammals made by Mr. A. L. Butler on the Upper Nile.* By R. C. Wroughton.

The specimens here dealt with were obtained for the most part from two localities, viz. the Blue Nile and Mongalla on the White Nile. Practically all the forms have already been described, but good specimens are valuable. A rat and the dassie alone seem to be without a name, and they are such distinct species that I have had no hesitation in describing them. I am pleased to name the dassie after Mr. Butler.

(1) *Eidolon helvum*, Kerr.

♀. 156 (imm.; no skull). Roseires, Blue Nile.
♂. 154; ♀. 153. Madâl, Bahr-al-Ghazal.

(2) *Epomophorus labiatus*, Temm.

♀. 155. Jebel Maba, 25 miles south of Roseires, Blue Nile.

(3) *Lavia frons affinis*, And. & Wr.

♂. 146, 151; ♀. 150. Kojali, Bahr-al-Ghazal.
♂. 148, 150; ♀. 147, 152. Mongalla.

(4) *Pipistrellus rueppelli*, Fisch.

♂. 157. Mongalla.

(5) *Chœrephon emini*, de Wint.

♂. Roseires, Blue Nile.

(6) *Crocidura doriana*, Dobs.

♂. 142. Mongalla, Bahr-al-Ghazal.

(7) *Erinaceus æthiopicus*, Ehrenb.

149. ? ?

(8) *Viverra civetta*, Schreb.

203. Wau, Bahr-al-Ghazal.

(9) *Genetta dongolana*, H. & E.

122. Khartoum, Sudan.

(10) *Genetta æquatorialis*, Heugl.

♂. 121. Mongalla, Bahr-al-Ghazal.

(11) *Mungos ichneumon*, L.

♂. 115; ♀. 109. Mongalla, Bahr-al-Ghazal.

(12) *Crossarchus fasciatus*, Desm.

108, 110. White Nile.

(13) *Vulpes famelica*, Cretzschm.

♀. 123. No. 2 Station between Halfa and Khartoum, Sudan.

♂. 124. Khor Arbat, Port Sudan.

(14) *Ictonyx erythreæ*, de Wint.

117, 118; ♂. 116. Khor Arbat, Port Sudan.

♂. 107. Roseires, Blue Nile.

(15) *Ictonyx frenata*, Sund.

♂. 120. Omdurman, Sudan.

(16) *Heliosciurus multicolor madogæ*, Hell.

166. Abu Ramla, Dinder River (*F. J. L. Atterbury*).

(17) *Euxerus leucombrinus*, Rüpp.

♂. 113, 114; ♀. 111, 112. Roseires, Blue Nile.

(18) *Gerbillus pygargus*, F. Cuv.

164, 174. Khartoum, Sudan.

(19) *Dipodillus watersi*, de Wint.

165, (?), 171. Khartoum, Sudan.

(20) *Taterillus emini*, Thos.

♂. 101; ♀. 172. Mongalla, Bahr-al-Ghazal.

(21) *Taterillus butleri*, Wrought.

♂. 173. Raffile, Bahr-al-Ghazal.

♀. 169. Wau, Bahr-al-Ghazal.

(22) *Leggada bella*, subsp.

♂. 106; ♀. 104. Mongalla, Bahr-al-Ghazal.

Geographically these should be either *gondokoræ* or *enclavæ*, but from Mr. Heller's descriptions I am unable to assign them, definitely, to one more than the other.

(23) *Epimys alghazal*, Wrought.

♂. 136. Wau, Bahr-al-Ghazal.
♀. 136. Tembura, Bahr-al-Ghazal.

(24) *Epimys* sp. (multimammate).

♂. 125, 130, 131, 132, 133, 137; ♀. 127, 128, 138, 139, 140, 141, 144, 145. Mongalla, Bahr-al-Ghazal.

(25) *Epimys azrek*, sp. n.

♂. 126; ♀. 129. Roseires, Blue Nile.

An *Epimys* of the multimammate group, of medium size, with a pure white abdomen.

Fur of back rather short (7 mm.). General colour above "mouse-grey," with a very faint fulvous wash, the individual hairs slate-grey, with short buffy-white tips; below pure white, the hairs white to their bases. Face coloured like back. An indistinct buff streak from below the eye, along the flank, to the base of the tail. Chin, throat, and inner side of fore limbs pure white, like the belly; inner side of hind limbs less purely white, the basal half of the hairs being grey. Hands and feet white. Tail sparsely covered with minute pale hairs, not visible to the naked eye, the scales fine, about 10 to 5 mm.

Dimensions unfortunately not recorded by the collector. The tail, measured in the dry specimen, is 115 mm., and the body-measure is probably the same or slightly longer; hind foot 22, ear about 15 mm.

Skull: condylo-incisive length 26 mm.; zygomatic breadth 14; nasals 12·5; palatilar length 13·5; diastema 8; upper molar series 5.

*Hab.* Roseires on the Blue Nile.

*Type.* Young adult male. Collector's number 126. Collected by Mr. A. L. Butler in the summer of 1910.

The two specimens closely resemble one another, except that in the female the buff stripe is obsolete on the flank. I know of no other multimammate mouse with a pure white lower surface; the form from Lake Chad is the nearest, but

even in that all the hairs are grey at the base. Sundevall's *macrolepis*, also from Roseires, must resemble the present species very closely in general colouring. He describes it as "Supra fulvescenti-murinus, lateribus magis flavescens, subtus albus, limite definito." The dimensions he gives, however—viz.: hind foot 27 and length of skull "ad suturam posticam ossis transversi 32 mm.,"—indicate a markedly larger animal, while the character on which the name is based, viz. the size of the caudal scales, is certainly not found in the present animal, in which these scales are less than half the size of those in *macrolepis*.

(26) *Arvicanthis testicularis*, Sund.

103, 160, 161, 162, 163. Khartoum, Sudan.

(27) *Arvicanthis rubescens*, Wrought.

♂. 102, 158, 159. Mongalla, Bahr-al-Ghazal.

(28) *Thamnomys macmillani gazellæ*, Thos.

♂. 167. Tembura, Bahr-al-Ghazal.

(29) *Dasymys orthos*, Hell.

♂. 134. Mongalla, Bahr-al-Ghazal.

(30) *Jaculus gordoni*, Thos.

105, 175–202. Khartoum, Sudan.

(31) *Thryonomys swinderianus*, Temm.

♀. 119. Akanda, Bahr-al-Ghazal.

(32) *Procavia butleri*, sp. n.

A fair-sized dassie, with a dark face, indistinct black dorsal mark, and buffy-grey abdomen.

Hair short (25 mm.) and rather harsh. General colour above "wood-brown," more fulvous on the flanks; face dark, black-brown, minutely grizzled with white; below pale buffy grey. Individual hairs of back basally very dark brown (10 mm.), remainder (15 mm.) buffy white with a black tip. Dorsal spot small, not well marked, black. Hands and feet grey.

Length of hind foot 63 mm.

Dimensions of skull: condylo-incisive length 93; basilar

length 82; zygomatic breadth 55; nasals 25; upper molar series 38.

*Hab.* Jebel Fazogli, Blue Nile. Alt. 3500 feet.

*Type.* Old male (Stage VIII.). Collected by Mr. A. L. Butler on the 4th May, 1911.

The British Museum possesses a second specimen from Gebel Ain on the White Nile. The only other, geographically neighbouring, species with a black dorsal mark is *scioana*, but that species is at once distinguishable from *butleri* by its greater size, long soft fur, conspicuous dorsal mark, and buff belly.

(33) *Procavia ruficeps*, H. & E.

♂ (juv.). Port Sudan.

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## LVIII.—*Descriptions of new Scorpions.* By S. Hirst.

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### Genus Neobuthus, nov.

Carapace without distinct keels (with the exception of the ill-defined pair leading forwards from the ocular tubercle). Posterior grooves of carapace very similar to those of the genus *Butheolus*, Sim. Genital operculum with its two valves similar in shape to and almost as large as those of *Nanobuthus*, Poc. Posterior tergites with three keels, the lateral ones being weak. Immovable finger of chelicera with a single tooth on the lower edge. Chela stout, especially the brachium; the rows of granules of the movable finger are weak, and the basal row comes to an end at a short distance from the point of articulation of the finger.

### *Neobuthus berberensis*, sp. n.

*Carapace* finely granular throughout, the granulation being slightly coarser at the posterior margin on each side of the groove. A pair of weak and indistinct keels runs forward from the ocular tubercle. Median eyes widely separate as in *Nanobuthus andersoni*, Poc. Grooves of the middle of the posterior margin deeper than in *N. andersoni*.

*Tergites* with the granulation fairly strong at the sides, but rather fine in the middle, and very fine (almost invisible)

anteriorly in each tergite. First and second tergites with traces of the median keel only. Tergites 3–6 with three rather short granular keels, which are restricted to the posterior half of the segments; the median one is much the strongest and is continued forwards by a dark line.

*Sternites* smooth and shining except for the last one, which is finely granular and has four weak granular keels, the outer pair being indistinct.

*Tail.*—First segment of tail the widest, the last two segments slightly narrowed. Caudal keels finely granular. In segments 1–3 they are ten in number; the superior and the two uppermost lateral keels are weak in these segments, especially in the third, the superior being weaker in the second and third segments than in the first; median ventral keels of second and third segments strong. In the fourth segment the superior keel is practically absent, weak traces of the anterior part of it alone remaining, and the superior lateral has almost disappeared also; the median lateral and the median ventral keels are absent. Only the inferior lateral keels are present in the fifth caudal segment, and their end granules are enlarged. Intercarinal spaces finely granular; the granulation in the middle of the ventral surface of the fourth segment is slightly coarser than that of the rest of the surface; a number of the granules of the distal end of the ventral surface of the fifth caudal segment are enlarged, and two longitudinal, almost keel-like series of granules, which converge at the proximal end of the segment, run down the centre of it. Upper surface of the segments of the tail rather weakly excavated and either quite smooth or with a few scattered granules only; a shallow dorsal depression is present just before the end of the fifth segment. *Vesicle* very similar in shape to that of *N. andersoni*; it is of fairly large size, but narrower than the last caudal segment, and is smooth, shining, and punctured; a low and inconspicuous tubercle is present at some distance below the sting.

*Chela* stout. Its femur is smooth below, but the dorsal surface is furnished with fine granules and has a weak granular keel posteriorly and traces of an anterior keel. Tibia much broader than the femur and than the hand and devoid of granulation. Hand smooth and without any granules; its fingers rather short, the movable one being about twice the length of the hand-back and furnished with five (?) weak series of granules (which are difficult to make out); with the exception of the proximal series each of them has a couple of outer granules at the proximal end and a single large granule on the inner side.

*Legs.*—Fine keels are present on the segments of the legs, those on the patellæ are the strongest.

*Pectines* with fifteen teeth on one side and sixteen on the other.

*Measurements in mm.*—Total length 30; length of carapace 3·5, of tail 17·5 ; width of first segment of tail 2·75, of last segment 2·25.

*Colour.*—Carapace fuscous, but with some small yellowish patches ; the lateral margins and the posterior grooves yellowish. Abdominal tergites fuscous, and each of them is marked with a pair of yellowish almost pyriform spots, one on each side of the dark median keel ; lateral margins of tergites also yellow. Tail yellowish, but slightly darkened in places ; the fifth segment more deeply infuscate, especially below ; lateral caudal keels mostly slightly darkened and the ventral keels very dark in segments 2–5. Vesicle yellow, with a very fine dark median line below and minute dark lateral patches; the apical half of the sting black. Appendages yellow ; chela with the femur slightly darkened above and at the sides, the dorsal keels being blackish; tibia also slightly darkened and marked with a dark line posteriorly below ; femora and tibiæ of legs with dark lines.

*Material.*—A single example from Berbera, Somaliland; collected by Mr. G. W. Bury.

*Remarks.*—This new scorpion seems to me to be most nearly allied to *Nanobuthus andersoni*, Poc., a species which, so far, is only known from a single specimen from Duroor, 60 miles north of Suakin, in the Anglo-Egyptian Sudan. The genital operculum is very similar in shape and size in these two species, and they resemble one another closely in the details of the structure of the keels and the granulation of both trunk and tail. Nevertheless, there are important differences between them, for a small tooth is present on the underside of the immovable finger of the chelicera of the new form and the chela is much stouter than in *Nanobuthus*.

From *Butheolus*, Sim., this new genus can be readily distinguished by the fact that the anteocular area of the carapace slopes forwards only very slightly and by the shape of the tail, which is much more slender and does not increase in size posteriorly.

### *Lychas* (*Hemilychas*) *alexandrinus*, sp. n.

*Carapace* granular throughout. Superciliary crests granular ; for some distance they are continued forwards, and then lose themselves in irregular groups of rather large granules,

and close to the anterior margin on either side some of these are arranged in a short keel-like series. Median keels comparatively well developed, especially the posterior median pair, which are quite well marked and strong.

*Tergites* granular; their lateral keels very short, even in the hinder segments, and in most of the segments they are represented by one or two enlarged granules only.

Anterior *sternites* smooth and shining, and at most with fine granulation at the extreme margin only. Penultimate sternite granular at the sides, but the granulation is very fine except at the margin. Last sternite granular throughout and with four granular keels.

*Tail* increasing in size posteriorly; last segment slightly swollen. Upper surface of segments 1–4 granular; fifth segment with the upper surface almost smooth anteriorly, but the shallow excavated area in which the median groove of this segment loses itself posteriorly is finely granular. Intercarinal spaces of segments 1–3 distinctly granular; the granules of those of the fourth have run together so as to form a confused network of low smooth ridges, and this causes the segment to appear a little smoother than the preceding ones, but not nearly so smooth as the fifth; the granules between the inferior median keels of the fourth are not fused to the same extent as those of the other intercarinal spaces of this segment. Caudal segments 1–3 each with ten distinct keels, those of the first and second and the upper ones of the third being distinctly granular. Terminal granule of the two upper keels of the first two segments slightly enlarged. Inferior lateral and ventral keels of the third segment smooth. With the exception of the superior all the keels of the fourth segment are smooth, and they are weaker than those of the preceding segments; the keels of the two upper pairs are especially weak and have almost disappeared; the medial lateral is still visible in the anterior two-thirds of the segment, but is exceedingly weak. Fifth caudal segment smooth, shining, and without any trace of keels, but furnished with large punctures. *Vesicle* smooth, shining, and with scattered punctures; the tooth under the aculeus large and blunt.

*Chela.*—Hand furnished with granules, which are distributed in an irregular manner; it has two well marked finger-keels, the part of them which is situated on the hand itself being granular, but the part on the finger smooth; an outer keel is also present on the dorsal surface of the hand, but it does not reach the apical end. Movable finger more than twice as long as the hand-back and with six median series of granules.

*Pectines* 20–21 in number.

*Measurements in mm.*—Total length 31; length of carapace 3·75, of first segment of tail 2, of fifth segment 3·75; width of first segment 2·5, of fifth 2·8.

*Colour* fawn except for the vesicle, which is a rather deep brown and is much darker than the rest of the body; fingers of hand pale yellow, the hand itself being fawn-coloured.

*Material.*—A single male example from Alexandria, Northern Territory of Australia; collected by the late Mr. W. Stalker, and presented to the Museum by Sir William Ingram, Bart., and Sir John Forest.

*Remarks.*—In having the last segment of its tail keel-less and punctured this new scorpion resembles the species of the genus *Isometroides* (which are restricted in distribution to Australia), but differs from them in having a strong tooth under the aculeus, as in *Lychas*. The posterior median keel of the carapace is well developed, instead of being absent or indistinct as is the case in all the species of *Lychas* that I have been able to examine. For these reasons I am placing this new form in a new subgenus—*Hemilychas*.

*Lychas ochraceus*, sp. n.

Resembling *L. pegleri*, Purc., in having two enlarged granules on the outer side of the enlarged basal granule of the median series (so that there is a row of three granules), also in the presence of three keels on the tergites and in the carination of the tail &c.

I have carefully compared this new scorpion with Dr. Purcell's detailed description of *L. pegleri*, and can only find the following differences:—

*Colour* of the new species apparently much lighter, both trunk and tail being tawny ochraceous and without any very distinct markings; a pale, rather indistinct, central stripe seems to run the length of the trunk, however. Chela yellowish, the hand being clear yellow, but the fingers tawny.

Anterior *sternites* smooth and shiny, but sternites 3–5 are finely granular throughout (the third and fourth being distinctly granular in the middle); outer keels of fifth sternite rudimentary; both the inner and the outer keels are finely granular, as is the case in *L. pegleri*.

*Pectinal teeth* 10 in number; as in *L. pegleri*, the basal one is very greatly enlarged.

*Measurements in mm.*—Total length 32·5; length of carapace 3·75.

*Material.*—A female specimen captured at Bethulie, in the Orange River Colony, by Miss Lettie Leppan.

*Babycurus ansorgei*, sp. n.

*Carapace* and *tergites* finely granular, as in *B. centurimorphus*, Karsch ; anterior edge of carapace almost straight. Last *sternite* practically smooth, the granulation being exceedingly minute; its keels are obsolete, the granules of which they are composed being scarcely visible (when examined under a hand-lens magnifying ten diameters).

*Tail* moderately stout, the fourth segment being the widest; fifth segment narrowed posteriorly. Intercarinal spaces very finely granular. Ventral keels weak and finely granular ; they are a little stronger than is the case in *B. neglectus*, Krpln., and even in the last segments, although very weak, they are still visible under a hand-lens. Upper keels considerably stronger than the ventral ones.

Hand of *chela* a little swollen and slightly wider than the tibia; the finger-keel apparently absent. Movable finger considerably longer than the hand-back ; as in *B. centurimorphus*, five median series of granules are present, besides the long basal series and the very short apical one.

*Pectines* with 18 teeth.

*Measurements in mm.*—Total length 55 ; length of carapace 6, of first segment of tail 3·5, of fourth 5·25, of fifth 7, of hand-back 4·5, of movable finger 6 ; greatest width of first segment of tail 3·5, of fourth 3·75, of fifth 3·5, of hand 2·75.

*Colour* reddish brown (of a shade approaching the walnut-brown given in Ridgway's 'Nomenclature of Colours'). Vesicle and the lower surface of the trunk paler in colour. Chela and the legs also reddish brown, the hand of the chela a little paler than the other segments, but its fingers are black.

*Material.*—A female specimen, collected by Dr. W. J. Ansorge at Dondo, N. Angola, on July 12th, 1908.

*Remarks.*—Allied to *Babycurus centrurimorphus*, Karsch, from which it differs chiefly in colour.

*Tityus funestus*, sp. n.

♂.—*Tail* about six times the length of the carapace, the third segment equalling it in length. Posterior segments much higher than is the case in *T. magnimanus*, Poc., and *T. pococki*, Hirst, the fourth, which is the highest, being very much less than twice as long as high [in *T. magnimanus* the fourth segment in the male is about two and a half times as long as high]. The shape of the upper surface of the posterior segments is very different also to what it is in these two

species ; at the anterior end of the upper surface of the fourth a deep and conspicuous pit-like excavation is present. Fourth and fifth segments much wider than the anterior ones, the fifth being the widest. Keels almost quite as strong in the male as in the female, but the terminal granule of segments 2–4 is only slightly enlarged and is not so strong as in the female [in *T. pococki* the caudal keels are distinctly weaker in the male than in the female]. Median lateral keel of second segment usually still discernible at the posterior end of the segment. Median keels of ventral surface of second segment approaching one another near the posterior end, and sometimes touching one another, but never fused ; in the third segment these keels are fused together posteriorly, so as to form a single median keel, and in the fourth a median keel similar to that of the fifth runs the entire length of the segment, but a lateral keel is present on either side of it at the anterior end ; similar lateral keels are sometimes present also in the fifth. Intercarinal spaces finely but distinctly granular.

*Hand* of chela very much wider than the tibia, but its width is less than the length of the hand-back ; fingers lobed, the movable one is about one and two-thirds the length of the hand-back.

*Pectinal teeth* 13–16 in number.

Movable finger of *hand* with fourteen rows of granules (including the basal one).

*Colour* varying from reddish brown to very dark brown ; whitish specks, similar to those present in young examples of *T. cambridgii championi*, Poc., are often present on the trunk, but they are very faint or absent in the darker examples ; last two segments of the tail (and the vesicle also) much darker than the anterior segments ; the basal two-thirds of the aculeus pale ; legs and chela reddish, they are speckled in the paler examples but unicolorous in the darker ones ; fingers of the hand blackish except for the tips, which are yellowish.

♀.—*Tail* very different in shape to that of the male, for it is not incrassate posteriorly, and the posterior segments are not nearly so high ; the impression on the dorsal surface of the fourth segment is not nearly so deep nor is it so well defined as in the male.

*Hand* about as wide as the tibia and with much stronger keels on its surface than in the male ; its movable finger is a little more than twice the length of the hand-back, and shows only a very slight tendency to lobation.

*Measurements in mm.*—♂. Total length 56 ; length of

carapace 6, of tail about 36, of fourth segment of tail 6·25, of hand-back 5, of movable finger 8·25; width of first segment of tail 3·75, of fifth 4·6, of hand 4·25, of tibia of chela 2·75; height of fourth segment of tail 4·25.

♀. Total length 55·75; length of carapace 6, of tail about 32·5, of fourth segment of tail 5·75, of hand-back 3·5, of movable finger 7·5; width of first segment of tail 3·5, of fifth 3, of hand 2·5; height of fourth segment of tail 3.

*Material.*—A number of specimens from Chama, Venezuela, including several adults, two of which are of the male sex.

*Urodacus hillieri*, sp. n.

♂.—Anterior part of *carapace* smooth and very finely punctured; the sides and posterior part of it finely granular.

*Tergites* finely granular and with the median keel very weak and inconspicuous; as in *U. hoplurus*, Poc., the inner keels of the last tergite scarcely reach the middle, but the outer ones are very long.

Last *sternite* with its pair of keels exceedingly weak and scarcely visible, instead of being rather strong as in *U. spinatus*, Poc.

*Tail* a little less than five times as long as the carapace; the upper surface and sides finely and sparsely granular, the lower surface of the fifth segment being more distinctly granular [in *U. hoplurus* the surface and sides of the tail are quite smooth and the lower surface of the fifth segment has only a few scattered granules]; terminal tooth of the superior keel of the caudal segments very large; it is not nearly so erect as is the case in *U. spinatus* and *U. hoplurus*, but points backwards. Inferior keels of anterior segments weaker than in *U. spinatus*, but not so weak as in *U. hoplurus*. The inferior median keels of the fourth segment smooth, instead of being weakly granular as in *U. spinatus*. *Vesicle* finely granular.

*Hand* very similar in shape to that of *U. hoplurus*; it has a row of 19 pores on the under surface (not counting those external to the keel) and two other pores placed on the inner side of and parallel to the first two of the row. Tibia with 14–15 pores below.

*Legs.*—Metatarsus of first leg with a row of 5 or 6 spines, that of the second with 5–7 spines.

*Pectinal teeth* 22–24 in number.

*Measurements in mm.*—Total length 96; length of carapace 12, of first segment of tail 7·25, of fifth segment 13; width of first segment 5, of fifth 3·75.

*Colour.*—Much darker than *U. spinatus* and *U. hoplurus*, the body being walnut-brown. Chela a deep chocolate-brown and considerably darker than the body (with the exception sometimes of the frontal lobes of the carapace). Legs ochraceous, the terminal segments paler than the others.

*Material.*—Two adult males and two young specimens from Hermannsburg, Central Australia ; they were collected by Mr. H. J. Hillier.

### *Urodacus hoplurus*, Poc.

*Urodacus hoplurus*, Pocock, Ann. & Mag. Nat. Hist. (7) p. 64 (1898).

#### Subsp. *carinatus*, nov.

Frontal lobes granular and the terminal tooth of the superior keel of the caudal segments very similar in shape and directed upwards in a similar manner to that of the typical form of the species. This new subspecies, indeed, apparently only differs from the typical form in the much greater strength of the superior keel of the caudal segments (which is composed of quite large and distinct granules instead of weak and indistinct ones) and in the less inflated and slightly narrower hand. I think that it is very probable that the difference in the form of the hand is due to the immaturity of the specimen.

*Chela.*—Under surface of hand with a row of 11 pores, which ends in a group of 5 pores at the base of the finger. Lower surface of tibia with a row of 11–13 pores.

*Pectines* with 20–21 teeth.

*Measurements in mm.*—Total length 76·5; length of carapace 9, of fifth segment of tail 10·5, of hand-back 6·25; width of hand 5·25.

*Material.*—A single example, of the male sex, captured near Hermannsburg, Central Australia, by Mr. H. J. Hillier.

### *Chœrilus robinsoni*, sp. n.

Apparently the only difference of importance by which this new species can be distinguished from *C. variegatus*, E. Sim., is the number of granular series on the edge of the movable finger, which is 11 instead of 13–14.

As there is not a male example of the typical form of *C. variegatus* in the British Museum collection, I am obliged to compare the new species with males of the subspecies *nigricolor*, Poc. Besides the difference in the number of the rows of granules on the finger, it differs from the male of

this subspecies in the following details, none of which seem to me to be of much importance:—Hand a little more swollen, its lobe not quite so well developed and with the edge thicker; keels of the upper surface slightly stronger; movable finger with a somewhat larger lobe. Upper keels of tail slightly stronger. Colour deep reddish brown; the upper surface of the trunk has no distinct markings, the legs, however, are variegated; tail rather a light reddish brown above, and the vesicle is ochraceous except at the sides, which are dark; hand paler than the trunk, but its keels are blackish.

*Pectinal teeth* 5 in number.

*Measurements in mm.*—Total length 44; length of carapace 6, of hand-back 5·4, of movable finger 6·25; width of hand 6.

*Material.*—A single adult male, found by Mr. H. C. Robinson under moss on a tree at Bukit Besar, Malay Peninsula, on the 27th of August, 1901.

*Scorpiops austerus*, sp. n.

♂.—Last *sternite* with weak keels, which vary considerably in strength in different specimens; in some they have almost disappeared.

Width of *hand* considerably greater than the length of the hand-back, the lobe greatly developed. Its upper surface is furnished with numerous fine ridges, most of which have fused with one another and form an irregular network; these ridges are smoother than in the female, usually they are obsoletely granular, but sometimes quite smooth. Inner edge of hand very different in appearance to that of *S. insculptus*, Poc.; it is strongly compressed, and a strong keel, which is either smooth or indistinctly granular, runs along the distal half of it. Keel of hand-back usually weakly granular, but sometimes smooth. Finger-keel strong and well developed throughout its length and often quite smooth, but sometimes (especially at the basal end) it is weakly granular. There is no trace of the weak inner crest which is present on the lobe of the hand of *S. insculptus*. Movable finger considerably longer than the hand-back. Pores of the lower surface of the hand and tibia exactly the same in number as in *S. insculptus*.

♀.—*Hand* narrower and its lobe less developed than that of the male, but its width is greater than the length of the hand-back. Its inner edge is not quite so compressed and usually has a weaker keel than is the case in the male. The

ridges on the dorsal surface of the lobe are often distinctly but very finely granular (but sometimes they are smooth), and usually they do not fuse together to the same extent as in the male.

*Pectinal teeth* 4–6 in number.

*Measurements in mm.*—♂. Total length 41; length of carapace 6, of fifth segment of tail 5·6, of hand-back 5, of movable finger 7; width of hand 7.

♀. Total length 42; length of carapace 6·75, of fifth segment of tail 6, of hand-back 5, of movable finger 6·5; width of hand 6.

*Colour* entirely dark.

*Material.*—A large number of specimens of both sexes from the Kulu District, Himalayas.

*S. crassimanus*, Poc. (a species which so far is only known from a single example of the female sex, without any locality), is closely allied to *S. austerus*, sp. n., but the granules of the upper surface of the hand are all separate and distinct, whilst the finger-keel is coarsely granular and is interrupted at the base of the finger; the other keels of the hand and tibia also are more coarsely granular than in *S. austerus*. The shape of the inner edge of the hand is very similar in these two species.

### *Scorpiops tibetanus*, sp. n.

♂.—Last *sternite* with the central keels better developed than those of *S. austerus*, sp. n.; the keels of the tail also, especially the ventral ones, are much stronger than they are in that species or in *S. crassimanus*, Poc. Inner edge of *hand* compressed and furnished with a keel, the distal part of which is smooth; but this keel is not nearly so well developed as it is in the male of *S. austerus*. Finger-keel only very indistinctly granular, but not so smooth as in *S. austerus*. Sculpturing of the dorsal surface of the lobe consisting of a number of series of rather fine granules; these series are arranged in a reticulate fashion, but are not fused with one another; the sculpturing is more like that of some of the female examples of *S. austerus* than the males. Fingers of hand very different in shape to those of the male of *S. austerus*, the movable one having a much larger lobe. Keel of the anterior edge of the upper side of the tibia and femur of the chela stronger than in *S. austerus*. Pores of lower surface of hand and tibia exactly as in *S. austerus*.

*Pectines* with 7–8 teeth.

*Measurements in mm.*—Total length 59; length of carapace 7·75, of fifth segment of tail 8, of hand-back 6, of movable finger 7·5; width of hand 6·75.

*Colour* blackish; the hand, however (with the exception of the fingers and keels), is reddish brown.

*Material.*—A single adult specimen, of the male sex, collected at the Chaksam Ferry, Tsangpo Valley, Tibet, by Lieut.-Colonel L. A. Waddell, C.B.

*Remarks.*—In addition to the differences which are given above, I may point out that this species is much larger than *S. austerus*, sp. n. It can be distinguished from *S. crassimanus*, Poc., by the structure of the finger-keel, which is almost smooth, by the presence of keels on the last sternite, and by the greater strength of the keels of the tail.

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## LIX.—*Some new Species of the Coleopterous Genus* Anomala *from Southern India.* By Gilbert J. Arrow.

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About seventy species of the enormous genus *Anomala* have already been described from British India, and over sixty of these are known to me, as well as a very large number which are still undescribed. I hope in a future volume of the 'Fauna of British India' series to attempt an orderly revision of this mass of closely related insects, whose nomenclature is at present in very great confusion. As this work cannot be completed for a considerable time, I propose to publish preliminary descriptions of some of the new forms, as these are constantly sent to me for determination and it is undesirable to circulate unpublished names.

I have received two important collections from Southern India, one of them made by Mr. H. Leslie Andrewes in the Nilgiri Hills, the other by M. du Breuil in Madura, the latter collection being the property of Baron Paul de Moffarts. The fauna of Southern India is the most purely Indian to be found within the limits of the Empire; the species are nearly all peculiar to that area, and in many cases form groups of closely related forms without any known representatives outside the area. For this reason it has not been possible to compare many of the new species figuring here with any others previously known.

The types of all the following species are in the British

Museum, which is indebted for them to Baron P. de Moffarts, Mr. H. L. Andrewes, and Mr. H. E. Andrewes.

*Anomala* (*Spilota*) *strigata*, Cast., is the only hitherto known representative of a group of closely similar South-Indian species. Unfortunately, the scanty description is confined to the colouring, which is almost the same in all, and it is impossible, without an examination of the type, to decide whether it belongs to one of the species here described or to another of the group unknown to me. I think it will not be disputed that it is desirable to describe and differentiate here all the forms known to me.

The following synopsis will supply a ready means of distinguishing the five species in question:—

1 (8). Fifth elytral interstice divided by an uninterrupted line of punctures.
2 (5). Pygidium finely and sparsely punctured; mesosternal process compressed and strongly curved.
3 (4). Hind femur strongly toothed in the male, slightly angulate in the female ..... *armata.*
4 (3). Hind femur simple ..... *innocens.*
5 (2). Pygidium strongly punctured; mesosternal process slender, not compressed nor very strongly curved.
6 (7). Sides of pronotum moderately punctured; no median yellow line; mesosternal process not very slender or sharp ..... *degenerata.*
7 (6). Sides of pronotum rugosely punctured; its middle with a broad yellow line; mesosternal process very slender and sharp ..... *rugilatera.*
8 (1). Fifth elytral interstice incompletely divided ..... *maduræ.*

*Anomala* (*Spilota*) *armata*, sp. n.

Pallide flava, viridi-metallica, verticis macula lata, prothoracis maculis duabus maximis, interdum confluentibus, scutello elytrorumque puncto postbasali obliquo, fascia postmediana interrupta aliaque subapicali integra fusco-viridibus, pygidii lateribus viridibus vel brunneis, viridi-cinctis; corpus ovatum, postice modice latum, capite dense punctato-rugoso, clypeo lato; prothorace et scutello nitidissimis, subtilissime punctatis, illius lateribus sat fortiter punctatis; elytris profunde punctato-striatis, interstitiis convexis, 5° punctorum serie integra diviso; pygidio distincte haud confertim punctato; processu mesosternali longo, fortiter curvato et compresso:

♂, pedum anticorum tibia acute bidentata, ungue interno profunde fisso; pedum posticorum femore subtus fortiter lobato:

♀, tibiis anticis haud acute bidentatis, femoribus posticis subtus angulatis.

Long. 16–17 mm.; lat. max. 8·5–9·5 mm.

*Hab.* Nilgiri Hills.

Pale yellow, entirely suffused with a metallic green lustre and decorated with dark green markings consisting of a broad patch on the vertex of the head, a large patch on each side of the pronotum, almost or quite extending to the front and hind margins and sometimes coalescing in the middle, the scutellum, an oblique basal elytral spot near it on each side, an indefinite postmedian interrupted stripe and a zigzag anteapical one. There is a large oval patch on each side of the pygidium, sometimes green and sometimes brown with a green encircling ring.

The shape is oval, slightly elongate, and rather broad towards the extremity. The clypeus and forehead are densely punctate-rugose. The prothorax and scutellum are very shining and extremely finely and sparingly punctured, with larger punctures at the sides of the former. The lateral margins are gently angulated before the middle, the hind angles nearly right angles, and the base gently lobed before the scutellum. The elytra are deeply striated, the striæ closely punctured, the interstices convex and the fifth divided longitudinally by a continuous row of closely-set punctures. The pygidium is very shining and finely and sparsely punctured. The mesosternal process is long, strongly curved, and a little compressed. The sides of the metasternum are closely punctured and thinly hairy. The front tibia is strongly bidentate and the longer claw of the front and middle feet cleft.

♂. The apical tooth of the front tibia is short, the upper one well marked. The lower lobe of the inner front claw is broad and angulated beyond the middle. The hind femur bears a strong blunt lobe a little before the middle of the lower edge.

♀. The apical tooth of the front tibia is long and blunt. The hind femur bears a distinct angulation before the middle of its lower edge.

I know of no other *Anomala* in which an armature of this kind is found in the male. Whether it is *A. strigata* of Castelnau it is not possible to determine.

### *Anomala* (*Spilota*) *innocens*, sp. n.

Pallide flava, metallico-nitens, verticis macula lata, prothoracis maculis 2 maximis interdum confluentibus, scutello, elytrorum puncto postbasali utrinque obliquo, macula mediana vaga fasciaque anteapicali fusco-viridibus, pygidii lateribus brunneis, viridicinctis; præcedenti valde similis, sed femoribus posticis simplicibus:

♂, pedum anticorum tibia extus obtuse dentata, ungue interno profunde fisso, lobo infero medio acute angulato.
Long. 15 mm.; lat. max. 9 mm.

*Hab.* Anamalai Hills (*H. L. Andrewes*); Travancore: High Range (*May*, Trivandrum Museum).

Pale yellow, with a metallic green or purple suffusion and decorated with dark green markings consisting of a broad patch on the vertex, a large patch on each side of the pronotum, the two partially coalescing in the middle and almost or quite reaching the front and hind margins, an oblique elytral spot near the scutellum on each side, a vague postmedian patch and a zigzag transverse stripe near the extremity. There is a large brown patch on each side of the pygidium surrounded with a green ring.

This species has the closest resemblance to *A. armata*, from which it differs chiefly by the absence of the femoral process in the male, the lower edge of the hind femur being only very gently sinuated. The upper tooth of the front tibia in the same sex is feeble and the lower lobe of the inner front claw is angulated at the middle and not beyond it. There is a marked difference in the shape of the œdeagus in the two species.

Both sexes were found by Mr. H. L. Andrewes, and a single male was taken by Mr. W. Davison in the same locality many years ago.

*Anomala* (*Spilota*) *degenerata*, sp. n.

Pallide flava, leviter viridi-metallica, verticis macula lata, prothoracis medio toto, scutello plus minusve, elytrorum nebulis vagis, pygidiique lateribus fusco-viridibus; ovata, postice modice lata, capite crebre subtiliter punctato-rugoso, clypeo lato; prothorace scutelloque nitidissimis, subtilissime punctatis, illius lateribus fortius; elytris profunde punctato-striatis, interstitiis convexis, 5° punctorum serie integra diviso; pygidio modice punctato; processu mesosternali sat longo, curvato, vix compresso.
Long. 18 mm.; lat. max. 7·5 mm.

*Hab.* Madura: Shembaganur (*P. du Breuil*).

Pale testaceous, entirely suffused with a metallic green lustre and decorated with dark green markings disposed as follows:—a patch on the vertex of the head, a broad median patch on the pronotum extending from front to hind margin and sometimes with an incomplete narrow pale median line, the sides or whole of the scutellum, a vague zigzag stripe near the extremity of the elytra and sometimes

still vaguer anterior patches near the suture, and a large oval spot on each side of the pygidium. The dorsal segments of the abdomen are striped with black and the tarsi are dark.

The form is rather broadly ovate. The clypeus and forehead are densely punctate-rugose. The pronotum is very shining and finely punctured, more strongly and a little more closely at the sides; the lateral margins are feebly angulated before the middle, the front and hind angles are sharp and the base is gently lobed in the middle. The scutellum is very minutely punctured. The elytra are deeply striated, the striæ closely punctured, the interstices convex, the fifth divided by an almost continuous row of closely-set punctures. The pygidium is moderately punctured. The mesosternal process is slender and acute, not compressed nor strongly curved. The sides of the metasternum are closely punctured and thinly clothed with yellow hair. The front tibia is sharply bidentate and the longer claw of the front and middle feet cleft.

♂. The lower lobe of the front inner claw is dilated and sharply angulated.

This and the following species have the pygidium strongly punctured. It is smaller than the two preceding, but a little larger than *A. rugilatera*, the pygidium and the sides of the pronotum are rather less strongly punctured than in the latter, and the dark patch on the thorax is not completely divided and frequently not at all.

*Anomala* (*Spilota*) *rugilatera*, sp. n.

Pallide flava, leviter viridi-metallica, verticis macula lata, prothoracis maculis duabus magnis, elytrorum fascia postica indistincta pygidiique lateribus fusco-viridibus; ovata, capite crebre rugoso, clypeo lato; prothoracis lateribus subrugose punctatis, medio cum scutello subtiliter parcissime punctulato; elytris profunde punctato-striatis, interstitiis convexis, 5° punctorum serie integra diviso; pygidio ubique fortiter punctato; processu mesosternali tenui, curvato, acutissimo.

Long. 11–13 mm.; lat. max. 6–7·5 mm.

*Hab.* Nilgiri Hills (*Sir G. F. Hampson*).

Pale testaceous, entirely suffused with metallic green and with dark green markings disposed as follows:—a bifid patch on the vertex of the head, a longitudinal stripe on each side of the pronotum, extending from front to hind margin, and a large oval spot on each side of the pygidium. There is a narrow, zigzag, transverse band just before the extremity of the elytra, the dorsal segments of the abdomen are black-striped, and the tarsi are dark.

This is generally a little more elongate than *A. degenerata*. The clypeus and forehead are densely punctate-rugose. The pronotum is very finely punctured in the middle and coarsely and closely at the sides, the lateral margins are angulated just before the middle, the front and hind angles are sharp, and the basal lobe is slight. The scutellum is very minutely and sparsely punctured. The elytra are deeply striated, the striæ closely punctured, the interstices convex and the fifth from the suture divided by an almost continuous row of closely-set punctures. The pygidium is rather closely and strongly punctured. The mesosternal process is extremely slender and sharp, not compressed nor strongly curved. The metasternum is closely punctured at the sides and clothed with tawny hair. The front tibia is sharply bidentate and the longer claw of the front and middle feet cleft.

♂. The lower lobe of the inner front claw is dilated and obtusely angulated.

This differs from all the allied species in having the scutellum pale and a broad median yellow stripe upon the pronotum completely dividing the dark colour into two longitudinal patches. The sides of the pronotum and the pygidium are also more coarsely punctured than in the other species. The mesosternal process is exceedingly acute and slender.

### *Anomala* (*Spilota*) *maduræ*, sp. n.

Pallide flava, lævissime metallica, verticis macula lata, prothoracis medio toto, scutello, elytrorum fascia postica indistincta pygidiique lateribus fusco-viridibus; capite crebre punctato-rugoso; prothorace scutelloque minutissime et parcissime punctulatis, illius lateribus fortius irregulariter punctato, elytris profunde punctato-striatis, interstitiis convexis, 5° antice serie punctorum interrupta prædito; pygidio polito, parce et minutissime punctulato; processu mesosternali sat longo, valde curvato.

Long. 10·5–11·5 mm.; lat. max. 6–7 mm.

*Hab.* Madura: Shembaganur (*P. du Breuil*).

Pale testaceous, suffused with a slight metallic lustre, with green markings disposed as follows:—a patch on the vertex, a broad median patch on the pronotum extending from front to hind margin, the scutellum, a vague zigzag stripe at the posterior end of the elytra, and a large patch on each side of the pygidium. The dorsal segments of the abdomen are striped with black and the tarsi are dark.

It is a small shortly ovate species, very shining above and beneath, with short pale yellow hair at the sides of the sternum. The head is densely punctate-rugose. The pro-

thorax is extremely finely and sparsely punctured, with a few larger punctures at the sides. The lateral margins are angulated before the middle and the base is subtruncate before the scutellum, which is very finely and irregularly punctured. The elytra are deeply striated, the striæ strongly punctured, the interstices convex, the fifth having only a few irregular punctures along the middle. The pygidium is very smooth, with minute and scanty punctures. The mesosternal process is slender, strongly curved and not compressed.

I have seen only three males.

This is the smallest species of this very closely connected group. It is almost identical in colouring with *A. degenerata*, but the pygidium and sides of the pronotum are much more finely punctured. The basal lobe of the thorax is very short and truncate, and may even appear to be almost emarginate when seen at a certain angle. The fifth interstice of the elytra has only an incomplete row of punctures.

*Anomala* (*Spilota*) *oculicollis*, sp. n.

Saturate viridi-purpurea, metallica, clypei frontisque medio nonnunquam, prothoracis lateribus (puncto elongato centrali excepto) lineaque mediana plerumque, elytris (marginibus fascia mediana communi maculisque indeterminatis anticis et posticis fuscis exceptis) pygidiique linea mediana flavis, femoribus posticis abdomineque plus minusve pallidis; corpore brevi, pygidii lateribus corporeque subtus flavo-pilosis, capite rugoso, prothorace, scutello pygidioque minuto sat parce punctatis; elytris profunde punctato-striatis; mesosterno breviter producto.

Long. 10–13 mm.; lat. max. 6–7·5 mm.

*Hab.* Madura: Shembaganur (*P. du Breuil*); Trichinopoli (*R. P. J. Castets*).

Deep metallic greenish-purple, with the sides of the pronotum (with the exception of an elongate spot) and generally a narrow incomplete median line, the elytra (with the exception of the sutural, external, and posterior edges, a common median transverse fascia produced a little forwards at the middle of each elytron, and variable markings near the anterior and posterior margins, which are black or dark brown), and a median longitudinal line upon the pygidium pale testaceous. The hind femora, abdomen, and sometimes the tibiæ are variegated with yellow.

It is a small compact species, with the prothorax proportionally rather long. The clypeus is rather narrow, with the forehead densely punctate-rugose. The pronotum is shining and very finely and sparsely punctured. The sides are gently

angulated before the middle, nearly parallel behind, the hind angles are right angles, and the base is scarcely lobed. The scutellum is minutely punctured, rather short and blunt. The elytra are deeply punctate-striate, with the subsutural interstice broad and generally completely, but sometimes incompletely, divided by a line of deep punctures. The pygidium is very smooth and shining, with fine and rather scanty punctures. The mesosternal process is short and conical, sometimes very acute, sometimes scarcely produced. The sides of the pygidium and the body beneath are thinly clothed with rather long yellowish hair. The front tibia is strongly bidentate.

♂. The lower lobe of the inner anterior claw is very broad and sharply angulated at the middle of the lower edge and the upper lobe is very small. The club of the antenna is half as long again as in the female.

This variable species has sometimes a deceptive resemblance to the last one described, but may always be distinguished by its dark head, relatively longer prothorax, and especially by the form of the mesosternal process. This varies greatly, but is always short and straight and not slender and curved.

### *Anomala gemmula*, sp. n.

Supra læte viridis, subtus cum pedibus et pygidio cuprea, clypeo et scutello plus minusve cupreis, pronoto nonnunquam leviter metallico, elytris paulo dilutioribus; ovata, convexa, pronoti lateribus, elytrorum apicibus, pygidio corporeque subtus albopilosis, clypeo parvo, rugose punctato, fronte grosse punctata, pronoto modice fortiter et æqualiter punctato, lateribus medio angulatis, antice convergentibus, angulis posticis obtusis, basi medio leviter lobato, immarginato; scutello sat lato, vix punctato; elytris seriato-punctatis, seriebus geminatis, interstitiis alternis latis, irregulariter punctatis; pygidio fortiter punctato, mesosterno producto, haud acuto, subito deflexo.

Long. 11·5–13 mm.; lat. max. 6·5–7·5 mm.

*Hab.* Trichinopoli (*P. Rebière*, 1885); Kodeicanel (*J. Castets*, 1886); Shembaganur (*P. du Breuil*).

Bright grass-green above, with the elytra a little lighter in colour, the head and scutellum more or less coppery, the pronotum sometimes slightly opalescent, the legs, pygidium, and lower surface coppery.

It is a small, ovate, shining species, rather densely clothed with white hair on the lower surface and the pygidium, and with the inner edges of the eyes, the lateral margins of the

pronotum, and the extremities of the elytra fringed with similar hairs. The clypeus is rather small, rounded and strongly reflexed at the margin and rugosely punctured, and the forehead is coarsely punctured. The pronotum is rather strongly and evenly punctured, the sides angulated in the middle, scarcely curved, the hind angles obtuse, the base gently lobed and not margined. The scutellum is rather broad and scarcely punctured. The elytra have several double rows of punctures, with broad and irregularly punctured spaces between. The pygidium is strongly punctured. The mesosternum is produced into a narrow, rather compressed but not acute process, which is not at all curved but abruptly bent downwards in front of the middle coxæ and sometimes nearly vertical.

♂. The inner front claw forms a broad, rather sharp-pointed lamina, very minutely cleft on its outer edge. The club of the antenna is as long as the footstalk.

Among fifteen specimens in the British Museum, the Paris Museum, and the collection of Baron de Moffarts I have seen no females.

The deflexion of the sternal process is a peculiar character which I have never found elsewhere. The process is generally nearly vertical, but the angle of flexion varies and is occasionally very obtuse.

### *Anomala agnella*, sp. n.

Pallide testacea, supra leviter metallico-nitens, capite, prothorace scutelloque cupreo- vel æneo-brunneis; ovata, convexa, pronoti lateribus, elytrorum apicibus, pygidio corporeque subtus sat longe griseo-pilosis; clypeo parvo, rugose punctato, fronte grosse punctata, prothorace sat fortiter punctato, lateribus ante medium angulatis, antice approximatis, angulis posticis obtusis, basi immarginato, leviter lobato; scutello parcissime punctato; elytris seriato-punctatis, seriebus geminatis, interstitiis alternis latis, irregulariter punctatis; pygidio rugose punctato; mesosterno producto, processu recto, acuto.

Long. 10–13 mm.; lat. max. 6–7·5 mm.

*Hab.* MADURA: Shembaganur (*P. du Breuil*).

Pale yellow, with a very slight metallic lustre, the head, prothorax, and scutellum coppery green or bronzy.

It is a stout-bodied ovate insect, with its greatest breadth near the posterior end, and rather thickly clad with greyish hair on the lower surface, the pygidium, and extremities of the elytra. The inner edges of the eyes and the lateral margins of the pronotum are also bordered with white hairs.

The clypeus is small and rugose, the forehead coarsely punctured, the pronotum strongly and rather closely punctured. The sides of the latter are feebly angulated before the middle, the hind angles very obtuse, and the base gently lobed before the scutellum and not margined. The scutellum is sparingly punctured. The elytra bear double rows of well-marked punctures and the alternate intervals are broad and bear similar but irregular punctures. The pygidium is closely and rather finely punctured. The mesosternal process is short, straight, and very sharp. The mesosternum is densely punctured at the sides and the abdomen moderately punctured all over. The antennal club is rather long in both sexes and the front tibia is strongly bidentate.

♂. The inner anterior claw forms a broad sharply pointed lamina and is minutely cleft at the outer edge.

*A. agnella* is closely related to *A. gemmula*, which it resembles in the clothing of whitish hair, but it is stouter and quite differently coloured, and the sternal process is horizontal.

*Anomala luridicollis*, sp. n.

Pallide flava, capite cuprea vel viridi-ænea, prothorace tibiisque rufis, leviter metallicis, pygidio plerumque obscure brunneo, corpore sat elongato, postice paulo latiori, subtus cum pygidio longe grisco-hirto, clypeo parvo, rugoso, fronte rugose punctata, prothorace brevi, sat crebre irregulariter punctato, lateribus fortiter arcuatis, angulis omnibus rotundatis, basi toto marginato, trisinuato; scutello minute punctato; elytris sat minute et regulariter seriato-punctatis; pygidio inæqualiter parum dense punctato, pilis longis erectis parce vestito; mesosterno haud producto.

Long. 11 mm., lat. max. 6 mm.

*Hab.* MADURA: Shembaganur (*P. du Breuil*).

Pale yellow, with the head coppery or deep metallic green, and the pronotum, scutellum, and tibiæ crimson with a metallic lustre. The body is rather elongate and parallel-sided, with its greatest width near the posterior extremity, the lower surface and pygidium are clothed with rather long grey hair and the pygidium is more or less brown in colour. The eyes are large, the clypeus small and rugose, with the margin strongly reflexed and the forehead roughly and irregularly punctured. The pronotum is rather uniformly but not very closely punctured, with a trace of a median groove; it is short, with all the angles rounded off, the sides strongly curved the base trisinuated and completely margined. The

scutellum bears a few fine punctures. The elytra are moderately closely and regularly punctured in rows. The pygidium is rather strongly but unequally punctured and thinly clothed with long erect grey hairs. There is no mesosternal process.

I have seen only male examples, in which the antennal club is very long, the front tibia is strongly bidentate, and the inner front claw dilated, very acute, and minutely cleft at the outer edge.

### *Anomala peninsularis,* sp. n.

Viridi-cuprea, pronoti et pygidii lateribus, corpore subtus femoribusque testaceis, tibiis tarsisque rufescentibus, pronoti pygidiique medio plerumque viridioribus; ovata, sat elongata, modice convexa, pectore dense, abdomine parce, fulvo hirsutis; capite crebre rugoso-punctato, clypeo late arcuato; pronoto ubique distincte punctato, lateribus arcuatis, angulis omnibus paulo rotundatis, basi leviter trisinuato, fere marginato; scutello minute punctato; elytris fortiter et crebre seriato-punctatis; interstitio subsuturali lato, irregulariter punctato; pygidio minutissime rugoso; mesosterno haud producto; tibiis anticis fortiter bidentatis, tarsorum anticum et intermediorum ungue majori bifido.
Long. 14·5–16·5 mm.; lat. max. 8–9·5 mm.

*Hab.* MADURA: Shembaganur (*P. du Breuil*).

Coppery, with the pronotum and pygidium generally darker and more green, their lateral margins, as well as the lower surface of the body and the femora, yellow, the tibiæ and tarsi reddish brown. The head and clypeus are densely and rugosely punctured, the latter broadly rounded in front. The pronotum is evenly and moderately strongly punctured, its sides are rounded, the angles distinct but not sharp, and the base very gently trisinuate, with a margin defined in the middle by irregular punctures but not by a stria. The scutellum bears a few fine punctures. The elytra are strongly and closely punctured, most of the punctures forming longitudinal rows, but with a broad subsutural space which is irregularly punctured. The pygidium is microscopically rugose. The metasternum is densely punctured and thickly clothed with tawny hair, and the abdomen is finely and sparingly punctured, with a few setæ only. The mesosternum is not produced. The front tibia is strongly bidentate and the larger claw of the front and hind tarsi cleft.

♂. The inner anterior claw is broad, sharply angulated near the base, and acute at the tip.

*Anomala carneola*, sp. n.

Pallide flava, capite, prothorace, pedibus corporeque subtus leviter viridi- vel rufo-cupreis, elytris plerumque lævissime erubescentibus; sat breviter ovata, convexa, postice lata, pectore sat dense flavido-hirto; capite punctato-rugoso, clypeo fere semicirculari, margine alte reflexo, vertice et pronoto fortiter sat crebre punctatis, hujus lateribus medio angulatis, angulis anticis fere rectis, posticis obtusis, basi omnino marginato, leviter trisinuato; scutello minute punctato; elytris crebre punctato-striatis; pygidio, sterno abdomineque crebre punctatis; tibiis anticis fortiter bidentatis.

Long. 12–13·5 mm.; lat. max. 7–7·5 mm.

*Hab.* Nilgiri Hills (*H. L. Andrewes*).

Pale testaceous, with a very faint rosy tinge, the head and pronotum coppery or coppery green. There are usually vague dark markings upon the hind femora and the posterior part of the abdomen.

The form is short and ovate, with the greatest breadth behind the middle of the elytra. The clypeus and forehead are rugosely punctured, the clypeus nearly semicircular, with its margin strongly reflexed. The vertex and pronotum are rather strongly punctured. The sides are angulated about the middle, the front angles nearly right angles, the hind angles obtusely rounded, the base gently sinuated and entirely margined. The scutellum is minutely punctured and the elytra bear closely packed impressed rows of rather larger punctures. The pygidium, metasternum, and abdomen are closely and evenly punctured, and the mesosternum is not produced. The front tibia is bidentate and the larger claw of the front and middle feet is cleft.

♂. The antennal club is moderately long, the last ventral segment scarcely punctured, and the inner front claw broad, acute, and cleft.

*Anomala semiænea*, sp. n.

Obscure ænea, vel nigro-viridis, elytris, pedibus abdomineque rufo-castaneis, nonnunquam leviter viridescentibus; parum elongata, aut convexa, postice lata, pygidio, pedibus corporeque subtus longe griseo-pilosis; capite grosse punctato, clypeo lato, antice fere recto, pronoto modice, lateribus fortius, punctato, marginibus lateralibus medio angulatis, angulis anticis fere rectis, posticis obtusis, basi subtiliter arcuato, immarginato; scutello minute punctato; elytris striatis, striis interstitiisque nonnullis punctatis; pygidio densissime rugoso-punctato, metasterni lateribus abdomineque fortiter punctatis.

Long. 9–11 mm.; lat. max. 5–6·5 mm.

*Hab.* Nilgiri Hills (4000–6000 feet, April and May).

Deep metallic green or coppery green, with the elytra, abdomen and legs chestnut-red, often with a very faint metallic tinge.

This is a small, not very convex, species, with the prothorax short and not broad and the elytra dilating from the shoulders almost to the extremities. The pygidium and the whole lower surface are clothed with rather long erect grey hair. The clypeus is broad, rugosely punctured, and nearly straight in front, the forehead coarsely punctured, the pronotum moderately finely in the middle and a little more coarsely at the sides. The outer margins are angulated at the middle, the front angles nearly right angles, the hind angles obtuse, the base very gently curved and not margined. The scutellum is minutely punctured. The elytra are deeply but unevenly striated, with moderately fine punctures in the striæ and upon the alternate interstices, which are broader than the rest. The pygidium is very finely and densely punctured, the sides of the metasternum strongly and closely and the abdomen coarsely and sparingly. There is no mesosternal process. The front tibiæ are strongly bidentate and the larger claw of the front and middle tarsi is cleft.

♂. The front inner claw is broad, abruptly angulated near the middle of the lower edge, acute and strongly bifid.

A series of males, without females, has been taken by Mr. H. L. Andrewes.

*Anomala mus*, sp. n.

Pallide flava, fronte, pronoti medio, humeris, pygidii punctis 4 lateralibus, corpore subtus pedibusque partim nigro-æneis vel nigro-cupreis; parva, ovata, postice lata, subtus parce hirsuta, capite punctato-rugoso, clypeo fere semicirculari; pronoto nitido, fortiter et æqualiter, haud crebre punctato, lateribus valde arcuatis, angulis anticis fere rectis, posticis obtusis, basi leviter arcuato, linea marginali subobsoleta; scutello parce punctato; elytris grosse seriato-punctatis; pygidio grosse sat crebre punctato; metasterni lateribus crebre, abdomine minus crebre, punctatis; mesosterno haud producto; tibiis anticis fortiter bidentatis, pedum anticum et intermediorum ungue majori fisso.

Long. 6·5–8·5 mm.; lat. max. 4–5 mm.

*Hab.* Nilgiri Hills (6000 feet); Madura: Shembaganur.

Pale yellow, with the posterior part of the head, pronotum (except a lateral border, enclosing a dark spot, and a narrower front and hind border, and sometimes an incomplete narrow median line), the extreme edges of the elytra and a humeral

spot on each, two spots on each side of the pygidium, the lower surface, and parts of the legs coppery or greenish black.

A variety occurs in which the dark-coloured areas have extended and broad longitudinal dark bands appear at the suture and sides of the elytra and from the shoulder to the apex, leaving only a narrow thoracic margin, the scutellum, and two ill-defined stripes on each elytron pale. The Madura specimens are all of this variety.

It is small, ovate, and only sparingly hairy beneath. The head is rugose and the clypeus rather broadly rounded. The pronotum is very shining, strongly and rather evenly, but not thickly, punctured. The sides are strongly rounded, the front angles nearly right angles, the posterior angles very obtuse, and the base gently rounded, with a marginal line which is almost obsolete in the middle. The scutellum bears a few punctures and the elytra are rather strongly punctured in impressed rows. The pygidum is coarsely and rather rugosely punctured. The mesosternum is not produced. The metasternum is strongly punctured and thinly hairy at the sides and the abdomen strongly but sparsely punctured. The front tibiæ are strongly bidentate and the larger claw of the front and middle feet cleft.

♂. The inner front claw is broad, acute, and minutely cleft at the upper edge.

Males of this little species were found by Mr. Andrewes flying in swarms over grass during the daytime.

*Anomala* (*Singhala*) *polymorpha*, sp. n.

Læte flava, supra aureo-nitens, prothorace elytrisque concoloribus, vel partim vel toto nigris; ovata, parum convexa; capite fortiter punctato; prothorace subtiliter parce punctato, lateribus arcuatis, angulis anticis acutis, posticis nullis, basi leviter arcuato, angustissime marginato; scutello punctato; elytris sat fortiter et æqualiter seriato-punctatis, punctulis minutissimis nonnullis sparsis; pygidio fortiter punctato; metasterno abdomineque grosse punctatis, vix pilosis; tibiis anticis fortiter bidentatis, tarsorum anticum et intermediorum unguibus profunde fissis:

♂, clypeo antice subito dilatato, valde reflexo, margine fere recto; tarsis anticis crassis, ungue majore dilatato:

♀, clypei angulis rotundatis, elytrorum margine externa ante medium paulo dilatata et plicata.

Long. 7·5–8 mm.; lat. max. 4 mm.

*Hab.* Nilgiri Hills.

It is a comparatively large species of similar form to

*A. helleri*, Ohaus, but distinguished by its pale ground-colour and metallic lustre. The head and clypeus are more strongly, and the pronotum much more lightly, punctured.

Five specimens of this species taken by Mr. H. L. Andrewes are all different in colour. All have a yellow ground-colour, with a slight golden lustre upon the upper surface.

(*a*) is a female entirely yellow, with the head and pronotum a little more orange.

(*b*) is a female with a vague crescentic brown mark on each side of the pronotum.

(*c*) is a male with the head behind the eyes, a circular patch in the middle of the pronotum, the suture (narrowly), the basal (broadly) and external margins of the elytra and the basal segments of the abdomen dark.

(*d*) is a female with the head behind the eyes, the pronotum (except the lateral margins), and the elytra dark.

(*e*) is a female with the elytra alone dark.

It is oval, not very convex, and almost devoid of hairy clothing. The head and clypeus are rather strongly but not rugosely punctured, the pronotum very lightly and sparingly punctured and shining, with the sides and base gently rounded, the latter very narrowly margined and the hind angles obsolete. The scutellum is distinctly punctured and the elytra bear rows of rather close strong punctures. The pygidium is strongly and moderately closely, the metasternum very coarsely, and the abdomen rather strongly, punctured. The front tibia is strongly bidentate and the longer claw of the front and middle feet cleft.

I am unable to retain *Singhala* as a distinct genus, its only distinctive feature being found in one sex alone, viz., the form of the clypeus of the male, which reappears in almost the same shape in *Anomala dorsalis*, F., and other unrelated species.

In addition to the new species just described, the following species of *Anomala* were also found in the same districts of Southern India:—

*A. varicolor*, Gyll.—Nilgiri Hills and Shembaganur. This is a very widely distributed form.

*A. elata*, F.—Nilgiri Hills. This is probably not synonymous with *A. varians*, Oliv., the identity of which is not at all certain.

*A. olivieri*, Sharp.—Nilgiri Hills. Closely related to the preceding.

*A. communis*, Burm.—Nilgiri Hills.

*A. ignicollis*, Blanch.—Nilgiri Hills.

*A. globulosa*, Sharp.—Nilgiri Hills.

*A. (Spilota) regina*, Newm.—Nilgiri Hills.

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## LX. — *Notes on the Coleopterous Family* Pselaphidæ *of the Group* Faronini *of New Zealand, with Descriptions of new Species.* By Major T. Broun, F.E.S.

In the new 'Coleopterorum Catalogus' published by Herr Junk of Berlin, in February 1911, the following genera are placed almost successively at the head of the Pselaphidæ: *Patreus*, Broun, *Exeirarthra*, Broun, first and second, *Sagola*, Sharp, being fifth. This last genus comprised, at that time, forty-seven species; four of these were described by Dr. Sharp, four by M. Raffray, one by Herr Reitter of Vienna, and the remaining thirty-eight by myself. The description of another species is in possession of the New Zealand Institute for publication, so that the fifteen new species now added make a total of sixty-three.

The search for these minute but attractive insects has been pretty steadily carried on for upwards of thirty years, but, notwithstanding my efforts, a great proportion of the species are still represented by single specimens only. In a few cases as many as five or six have been obtained amongst decaying leaves in the forests; most of the rare ones were found singly on the underside of logs.

Owing to the kindness of M. Raffray, the author of Wytsman's fine work on the Pselaphidæ, I have now been able to inspect every species of *Sagola* except two, and of these last I possess M. Raffray's figures and descriptions.

In former years, when less than a dozen species had been brought to our knowledge, the descriptive work was a comparatively easy matter, now it is just the reverse, so that there is no exaggeration in the statement that the careful comparison and detailed description of any single ordinary species fully occupy an entire day. The brief diagnoses of the older species, omitting as they did many essential details of form and sculpture, if repeated in the cases of new species,

would be almost worthless for the purpose of identification; but as most of them are really beautiful objects under a microscope, the prolonged study now necessary for the determination of species is not an altogether unwelcome task.

Experience proves that many species are confined to very limited areas. The extermination therefore of these harmless little creatures during the progress of settlement will, I feel sure, be sincerely regretted by all naturalists, most of all by our successors.

T. Broun.

Mount Albert,
Auckland, N.Z.,
25th July, 1911.

*List of Species described herein.*

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|---|---|---|---|---|---|
| 3361. | Sagola | puncticeps. | 3369. | Sagola | longicollis. |
| 3362. | „ | laticeps. | 3370. | „ | puncticollis. |
| 3363. | „ | angulifer. | 3371. | „ | auripila. |
| 3364. | „ | nitida. | 3372. | „ | crassicornis. |
| 3365. | „ | cognata. | 3373. | „ | guinnessi. |
| 3366. | „ | diversa. | 3374. | „ | connata. |
| 3367. | „ | latistriata. | 3375. | „ | longipennis. |
| 3368. | „ | basalis. | | | |

3361. *Sagola puncticeps*, sp. n.

Elongate, shining, body entirely dark fusco-rufous, legs pale chestnut-red, tarsi and palpi flavescent; pubescence greyish, rather scanty, thicker on the hind body.

*Head* moderately convex, nearly as wide as the thorax, almost obliquely narrowed behind the eyes; antennal tubercles slightly elevated, but only in front, rather more closely and distinctly punctured than the other parts; frontal channel deep and moderately broad, extending as far as the back of the eyes, occipital foveæ rather large. *Thorax* cordate, its length and breadth about equal, widest before the middle, apparently impunctate; the median impression large, irregularly subquadrate, the small basal foveæ not distinctly separated from it; lateral foveæ large, extending from the base to the middle. *Elytra* slightly longer than the thorax, obviously broader behind than at the base, their apices truncate; sutural striæ broad and deep, the dorsal composed of a basal puncture and an elongate impression which reaches backwards to the middle; near the sides and apices some fine shallow punctures are discernible, and across the front face of the basal margin there is a series of distinct punctures. *Hind body* rather longer than the

elytra, the third visible segment slightly longer, but not broader, than the second, the first shorter and without minute scales, terminal segments somewhat deflexed and, together, broadly subtriangular.

*Tibiæ* finely pubescent, the intermediate and posterior rather more dilated and arched externally, below the middle, than the anterior.

*Antennæ* stout, rather longer than the head and thorax, with outstanding greyish hairs; basal joint distinctly punctate, rufous, longer than the second and third, the former thick, longer than broad, but not globular, the latter small, yet longer than broad, somewhat obconical; joints 4–6 oblong and nearly equal, seventh and eighth rather shorter; ninth and tenth transverse, broader than preceding ones, eleventh a little longer than the penultimate.

*Underside* finely pubescent. Head with a large, subquadrate, central cavity. Abdomen finely punctate, fifth segment shorter than the fourth, the sixth in the middle, rather longer than fifth, strongly rounded, finely margined, and slightly depressed behind, the terminal semicircular, with thick margins.

In *S. misella*, 248, the head is hardly at all narrowed behind the eyes, and it is much less convex than that of *S. puncticeps*. The female of *S. prisca* may be distinguished by its longer elytra and subglobular second joint of the antennæ. Both of these belong to another section of the genus, *S. puncticeps* being placed near *S. duplicata*, 1581.

Length $2\frac{1}{2}$; breadth $\frac{2}{3}$ mm.

Tairua, Auckland. My specimen was found on the underside of a log during 1875, and had been set aside as a variety of *S. misella*, a species I had not seen and which, most likely, had been found by Mr. Edwards at Hokitika.

### 3362. *Sagola laticeps*, sp. n.

Nitid, dark fusco-rufous, elytra light sanguineous, legs pale infuscate, tarsi and palpi yellow, antennæ rufescent; pubescence suberect, elongate and conspicuous on the elytra and abdomen, more slender elsewhere, yellowish.

*Head* subtrigonal, as broad behind as the widest part of the thorax, with slightly prominent eyes, its hind angles obtuse; frontal channel only moderately deep, slightly medially angulate, with an indistinct slender stria proceeding backwards from it, occipital foveæ distinct, antennal tubercles a little elevated in front; the sides, behind the eyes, with greyish cilia. *Thorax* subcordate, widest and strongly

rounded at, and before, the middle, of about equal length and breadth; the median impression large and subquadrate, basal fovea small and punctiform, the lateral foveæ deep, but hardly extending as far as the middle. *Elytra* nearly a third broader than long, a good deal narrowed towards the base, which is slightly depressed, obsoletely punctate near the sides; sutural striæ broad and deep, the dorsal divided near the middle, there are no basal punctures between the striæ. *Hind body* quite a third longer than the elytra, the second and third visible segments equal, each longer than the first, the terminal ones, together, subtriangular and much paler than the others.

*Legs* elongate and slender, tibiæ nearly straight.

*Antennæ* rather longer than the head and thorax, with slender elongate hairs; basal joint red, stout and cylindric, quite the length of the second and third combined, second thick, oblong, not globular, third small yet distinctly longer than broad, gradually narrowed towards its base; joints 4–6 longer than broad, nearly oviform, seventh and eighth shorter but slightly broader, narrowed apically, ninth and tenth transverse, eleventh longer than tenth.

*Underside* reddish. Head with a deep transverse depression behind the middle, its hind angles not foveate. Abdomen distinctly pubescent, its fourth segment slightly longer than third, the first concealed, fifth nearly as long as the preceding, sixth deeply emarginate in the middle, the supplementary segment subconical.

The hind angles of the head are much less prolonged outwardly than in *S. eminens*, 2724, and its close allies, the eyes are distinctly smaller, the elytra shorter and more narrowed anteriorly, and the basal punctures between the sutural and dorsal striæ of *S. castanea* are absent. The head is more trigonal than that of *S. major*, the eyes are evidently smaller, the elytra are shorter and obviously narrowed towards the base, there are no minute brassy squamæ on the first visible dorsal segment, and the coloration is entirely different.

♂. Length $2\frac{2}{3}$; breadth $\frac{2}{3}$ mm.

Greymouth. One of the last beetles sent to me by Mr. J. H. Lewis.

### 3363. *Sagola angulifer*, sp. n.

Subdepressed, nitid; head and thorax rufous, elytra and legs fulvescent, abdomen castaneous, tarsi and palpi yellow; the pubescence yellow, slender and decumbent on the head and thorax, suberect and conspicuous on the elytra and abdomen, this last with some coarser upright setæ.

*Head* broadly trigonal, its hind angles directed outwardly beyond the widest part of the thorax, antennal tubercles somewhat flattened ; the frontal channel is deep, moderately broad, and extends as far as the back of the eyes, and a fine stria proceeds further back, the occipital foveæ are small. *Thorax* convex, quite as broad as it is long, cordate, widest and strongly rounded near the front, much contracted behind ; median depression subquadrate, basal foveæ small and punctiform, lateral foveæ deep but not prolonged as far forwards as the middle, on the centre of the disc there is an abbreviated linear impression. *Elytra* hardly any longer than the thorax, a third broader than long, a good deal narrowed towards the base ; sutural striæ deep and broad, the dorsal ones much shorter and not distinctly punctate or divided, there are no punctures between the striæ. *Hind body* nearly double the length of the elytra, the second and third exposed segments about equal, the terminal attenuate, with a short appendage at each side.

*Antennæ* rufescent, longer than the head and thorax, with slender outstanding pubescence ; basal joint cylindric, second stout, fully half the length of the first, slightly narrowed near the base, third small, rather longer than broad, nearly oval ; joints 4–6 oblong, seventh and eighth slightly broader, conical, ninth and tenth transversely quadrate, eleventh longer than the penultimate.

*Underside* rufescent, finely punctate, with conspicuous vestiture. Hind angles of the head transversely concave throughout, the middle transversely bi-impressed and obliquely ciliate. Third and fourth ventral segments, singly, slightly longer than the fifth, which is truncate at the extremity, sixth short, the supplementary oblong, rather narrow, with a separate appendage at each side.

Resembles *S. eminens*, 2724, but more slender, with less robust legs and antennæ. The hind angles of the head are rather more acuminate and outwardly prolonged, and the basal foveæ are smaller. In 2724 the elytra are less narrowed towards the base, the suture is minutely sculptured, the dorsal striæ are divided into two nearly equal portions, and there is no median stria on the thorax.

♂. Length 2½; breadth ⅔ mm.

Waimarino. I found a single individual, at an altitude of 2700 feet, in January 1909.

3364. *Sagola nitida*, sp. n.

Shining, castaneo-rufous, legs and antennæ paler, tarsi

and palpi yellow; pubescence greyish yellow, slender, suberect behind.

*Head* nearly as large as the thorax, moderately curvedly narrowed behind the eyes, posterior angles obtuse, antennal tubercles a little elevated but flattened towards the front; the median channel deep, extending nearly to the base but narrower there than it is between the eyes, occipital foveæ small and punctiform; eyes slightly prominent. *Thorax* subcordate, widest near the middle, slightly broader than long; median depression subquadrate, basal foveæ small and punctiform, the lateral large and deep and extending forwards to the middle. *Elytra* nearly quite flat, not double the length of the thorax, fully as broad behind as they are long, moderately narrowed before the middle; sutural striæ somewhat contracted near the base and finely tripunctate there, alongside each there are two, or three, basal punctures, apparently not a constant character; the dorsal striæ do not reach the smooth base and consist of two basal punctures and a large impression behind these. *Hind body* slightly longer than the elytra, the first visible segment is much shorter than the next and bears some minute brassy scales, fourth considerably narrowed apically, fifth prominent, horizontal and narrow.

*Legs* moderately elongate; tibiæ straight inwardly, slightly arched externally.

*Antennæ* as long as the head and thorax, with long slender pubescence; basal joint rather longer than the second and third combined; second thick, quite as long as broad, subovate, third very small and subglobular; joints 4–8 about equal, as long as they are broad but distinctly contracted apically so as to appear laxly articulated, ninth and tenth slightly broader, transverse, the terminal rather longer.

*Underside* apparently impunctate, clothed with distinct yellow hairs. Head with a broad central depression, without cilia. Fourth ventral segment very slightly longer than the third; fifth rather shorter, feebly medially impressed, truncate behind; sixth short, also truncate, supplementary segment narrow, rounded apically, somewhat concave along the middle.

*S. puncticeps* is at once distinguishable by the deflexed terminal dorsal segment and the punctate, though similarly formed head. *S. duplicata*, near which this should be placed, may be recognized almost at a glance by the very obsolete, or entirely absent, occipital foveæ.

♂. Length $2\frac{1}{2}$; breadth $\frac{2}{3}$ mm.

Greymouth. When first received from Mr. J. H. Lewis

I thought this might be the female of *S. laticeps*, but after careful scrutiny it proves to be of the opposite sex and referable to a different section of the genus.

3365. *Sagola cognata*, sp. n.

Subdepressed, rather narrow, shining ; light chestnut-red, elytra and legs a little paler, tarsi and palpi testaceous ; pubescence greyish, rather thin.

*Head* scarcely as large as the thorax, nearly straight behind the eyes, with obtuse angles ; frontal channel deep, only moderately broad, a little narrowed behind and prolonged nearly to the base, occipital foveæ small. *Thorax* subcordate, of about equal length and breadth, widest and somewhat incrassate at the middle ; median depression large, deep, and subquadrate, basal foveæ punctiform and small, lateral foveæ comparatively small, with a well-marked groove proceeding from each nearly to the front. *Elytra* almost flat, rather longer than broad, moderately narrowed before the middle, a third longer than the thorax ; sutural striæ deep, indistinctly punctate near the base, with a distinct basal puncture near each, dorsal striæ well marked, quadripunctate, and extending backwards as far as the middle ; their surface not perfectly smooth but without definite punctation. *Hind body* a third longer than the elytra, minutely punctured ; the third visible segment rather longer than the second, which is distinctly longer than the first ; the fourth and fifth, together, subtriangular, nearly horizontal, and paler than the others.

Tibiæ slightly curved externally, tarsi moderately short.

Antennæ not longer than the head and thorax, with elongate slender hairs ; basal joint red, thick, twice as long as broad ; second also stout, subglobular, as is the small third ; fourth slightly longer than broad, oviform ; fifth and sixth loosely articulated, slightly dilated and widest in the middle ; seventh and eighth nearly similar but shorter ; ninth and tenth rather broader, quite transverse ; eleventh rather longer than the penultimate.

*Underside* pubescent. Head with a transverse depression in the middle. Sixth ventral segment simple.

Most nearly related to *S. brevitarsis*, 1579, but in it the third antennal joint is almost obconical and nearly as long as the fourth, which latter is hardly half as broad in front as it is at the base, the head is rather broader, and the thorax is wider before the middle, &c.

♂. Length 2½ ; breadth ½ mm.

Tairua. A single female found on the underside of a log about thirty-six years ago.

3366. *Sagola diversa*, sp. n.

Elongate, rather narrow, subdepressed, nitid; pale castaneo-rufous, legs testaceous; with scanty greyish pubescence.

*Head* slightly rounded behind the eyes, with obtuse angles; antennal tubercles moderately elevated, subcontiguous and obliquely truncate in front; occipital foveæ punctiform but well marked, the frontal channel deep, moderately broad, wider in front than behind and not reaching the base. *Thorax* subcordate, rather broader than long, widest near the middle, more narrowed in front than it is at the base; median depression deep, subrotundate, basal punctures distinct, the lateral foveæ rather small but prolonged as well-marked grooves nearly to the front. *Elytra* a third longer than broad, evidently longer than the thorax, a little narrowed before the middle, their punctation shallow and indefinite; sutural striæ normal, indistinctly punctate, with an elongate basal puncture near each, dorsal striæ elongate, apparently sexpunctate. *Hind body* a third longer than the elytra, the first three visible segments gradually increase in length, the second has a shallow median fovea, the fourth and fifth are nearly horizontal. *Tibiæ* nearly straight.

*Antennæ* hardly the length of the head and thorax; basal joint twice as long as broad, second stout, rather longer than broad, narrowed towards the base, the next of similar form, but much smaller; joints 4–8 nearly equal, not any longer than broad, submoniliform, ninth and tenth broader, transversely quadrate, the terminal conical, rather longer than the penultimate.

This is somewhat similar to *S. cognata*, but more elongate, with more slender legs and differently formed antennæ. The head is rather smaller, and the frontal channel almost cuneiform. The elytra and hind body are narrower, and the sculpture differs.

Length $2\frac{3}{4}$; breadth $\frac{1}{2}$ mm.

Midhirst, near Mount Egmont. The only example I possess was found under a log about twenty-five years ago.

3367. *Sagola latistriata*, sp. n.

Elongate, medially narrowed, slightly convex, shining; head, thorax, and basal joint of antennæ rufous, abdomen castaneous, elytra, legs, and antennæ more or less rufo-fulvous, tarsi and palpi yellow; pubescence yellowish, elongate and suberect, thicker on the abdomen, which also bears some long upright setæ.

*Head* moderately convex, nearly as large as the thorax, slightly narrowed behind the eyes, with rounded angles; frontal channel deep, angulate between the eyes, acuminate towards both extremities, and therefore somewhat diamond-shaped, it extends as far as the back of the eyes, occipital foveæ moderately large and reaching the base. *Thorax* cordate, about as long as it is broad, widest before the middle, not abruptly narrowed behind; median depression subquadrate, the basal pair of punctures distinct, lateral foveæ extending forwards to the middle. *Elytra* hardly any longer than the thorax, rather short, slightly broader than long, considerably narrowed towards the base; sutural striæ very broad and deep near the base, so that their outer borders and the suture seem somewhat elevated, dorsal striæ also deep, consisting of a basal puncture and elongate impression. *Hind body* nearly double the length of the elytra, rather broader, segments 1–3 slightly increase, fourth and fifth well developed but deflexed.

*Legs* stout; tibiæ arched externally; tarsi elongate.

*Antennæ* as long as the head and thorax, with elongate greyish hairs; basal joint cylindric, almost as long as the following three combined, second thick and rather longer than broad, suboviform, third nearly similar in shape but only half its size; fourth slightly longer than fifth, both evidently longer than broad, joints 6–8 slightly successively shortened and more or less contracted in front, ninth and tenth rather broader, transverse, eleventh longer than tenth, conical.

*Underside* rufo-castaneous. Head medially transversely depressed. Metasternum rather short and convex. Abdomen distinctly pubescent, its fourth segment slightly longer than the third, fifth slightly but widely incurved behind, sixth nearly the length of the fifth, the supplementary broadly conical.

In some respects like 2470, the female of *S. laminata*, but with its smaller eyes situated further from the back of the head, much stouter legs, larger thorax, &c. *S. lineata*, 2719, comes nearer, but this is differentiated therefrom by the basal joint of the antennæ, quite differently sculptured head, much shorter elytra, with much broader and deeper striæ, and more robust legs.

♂. Length 2½; breadth quite ⅔ mm.

Ligar's Bush, Papakura. My specimen was found amongst leaves on the ground.

3368. *Sagola basalis*, sp. n.

Elongate, narrowed anteriorly, subdepressed, shining;

head and thorax rufous, hind body more castaneous, elytra and legs rufo-fulvous, tarsi and palpi yellow; pubescence greyish, thinly distributed.

*Head* slightly narrower than thorax, nearly straight, and with obtuse angles, behind the rather small prominent eyes, obliquely, not abruptly, narrowed anteriorly; antennal tubercles but little elevated and subcontiguous, frontal channel deep, moderately broad, and extending as far as the back of the eyes, occipital foveæ distinct and slightly elongated. *Thoraæ* cordate, as long as broad, widest before the middle, considerably and somewhat abruptly contracted behind; its median depression deep and subquadrate, basal punctures distinct, and placed close to the hind angles and median depression, lateral foveæ deep but hardly reaching the middle of the sides. *Elytra* about a third longer than the thorax, as long as they are broad, a good deal narrowed before the middle, nearly flat; sutural striæ moderately broad and deep, indistinctly punctate near the base, dorsal striæ divided, the basal part punctiform, the other elongate, there are no punctures between the striæ. *Hind body* a third longer, and in the middle rather broader than the elytra, finely punctate, the penultimate segment quite distinctly so, second and third visible segments almost equal, first rather shorter, the terminal ones somewhat deflexed.

*Legs* elongate, moderately slender, tibiæ nearly straight.

*Antennæ* as long as the head and thorax, rather slender, with elongate pubescence; basal joint cylindric, nearly the length of the following three united; second slightly longer than broad, subovate, but contracted at the base; third oviform, small, yet slightly longer than broad; fourth and fifth oblong, equal; joints 6–8 a little broader than the preceding ones, gradually shortened, loosely articulated; ninth and tenth rather broader, transversely quadrate; the terminal conical and acuminate.

*Underside* pubescent, fourth and fifth ventral segments more distinctly punctured than the basal ones, 2–5 subequal, sixth obtusely triangular, its whole central portion concave, the supplementary indistinctly defined.

This should be located near *S. elongata*, 2472, the thorax, behind the middle, is rather sharply marked off at the sides from the lateral foveæ. The head is longer and more convex, and evidently more prolonged and narrowed anteriorly. The antennæ are more slender, differently formed, and have acuminate terminal joints. The type of 2472 is probably a male, the first exposed dorsal segment having minute squamæ.

♂. Length $2\frac{2}{3}$; breadth $\frac{2}{3}$ mm.

Paparoa Bush, near Howick. My specimen was found on the underside of a log.

3369. *Sagola longicollis*, sp. n.

Elongate, rather narrow, slightly transversely convex, nitid; head and thorax fusco-rufous, abdomen castaneous, elytra and legs paler but not fulvescent, tarsi and palpi yellowish; pubescence greyish yellow, not very thick, almost decumbent, mingled with a few erect, longer hairs on the hind body.

*Head* as wide as the thorax in line with the prominent eyes, slightly narrowed behind, with obtuse angles; frontal channel moderately broad, nearly as broad between the slightly raised antennal tubercles as it is behind, but not extending further back than the middle of the eyes, basal foveæ very distinct, rotundate. *Thorax* oviform, nearly twice as long as broad, widest at the middle; median depression subrotundate, basal foveæ minute, the lateral ones deep but not extending forwards beyond the middle. *Elytra* oblong, a third longer than the thorax, their sides very gently rounded and a little narrowed near the base; sutural striæ only moderately deep, indistinctly tripunctate at the base, with a small basal puncture near each, dorsal striæ distinctly divided, the basal part punctiform, the other longer. *Hind body* hardly as long or broad as the elytra, first visible segment evidently shorter than the next, third slightly longer, yet scarcely as long as the fourth, the terminal small.

*Tibiæ* slightly curved and dilated outwardly below the middle; basal two joints of the anterior tarsi, together, rather shorter than the third, distinctly separated, the second shorter above than below.

*Antennæ* rather shorter than the head and thorax, with elongate pubescence; basal joint thick, not twice as long as broad, second also stout but subglobular, third very small and rounded; fourth and fifth similar to the second but smaller, joints 6–8 broader than long, rather broader than the preceding ones, ninth and tenth transverse, broader than eighth, eleventh conical.

*Underside* pubescent. Head with a transverse depression between the front part of the eyes. Basal three exposed ventral segments thinly fringed at the extremity, 2–4 gradually become longer, fifth distinctly longer than fourth, sixth narrow, densely pubescent, emarginate at apex.

Although the structure of the terminal ventral segments cannot be accurately determined, the presence of minute brassy squamæ on the first visible dorsal segment is an indication of the male sex.

No other recorded species resembles this, which, on account of the elongate thorax, oblong elytra, and short antennæ, must be placed in a separate section of the genus.

Length 2 ; breadth $\frac{1}{2}$ mm.

Mahuia, near Mount Ruapehu. One individual picked out of leaf-mould which was collected for me by Mr. W. J. Guinness in January 1911.

3370. *Sagola puncticollis*, sp. n.

Slender, subdepressed, subparallel, shining; pubescence distinct, yellowish grey, mostly suberect; castaneo-rufous, legs and antennæ fusco-fulvous, tarsi and palpi testaceous.

*Head* moderately convex, nearly as large as the thorax, very slightly narrowed behind the eyes, with oblique angles ; antennal tubercles rather small, very slightly elevated, distinctly but not widely separated in front ; frontal channel moderately broad, not very deep, and not extending beyond the eyes, occipital foveæ distinct, not reaching the base. *Thorax* rather longer than broad, oviform, widest near the middle, smooth in front, the disc distinctly punctate; median depression subangulate, of moderate size, with a short linear impression proceeding from it towards the front, basal foveæ punctiform and small, the lateral foveæ rather small, hardly extending forwards to the middle. *Elytra* flat, a third longer than the thorax, slightly longer than broad, subparallel, indefinitely punctate; sutural striæ well marked, pluripunctate near the base, with a small basal puncture alongside each of them ; dorsal striæ divided, consisting of a basal puncture and an elongate impression which is prolonged beyond the middle. *Hind body* a third longer than the elytra, its first exposed segment rather shorter than the next, the fourth rather longer than the third.

*Tibiæ* slightly curved and expanded below the middle.

*Antennæ* as long as the head and thorax, bearing elongate pubescence; basal joint stout, not twice as long as broad, second not as thick as the first, as long as it is broad, with a short basal stalk, third similar but much smaller ; joints 4–8 submoniliform, each, however, successively more distinctly contracted near the apex, ninth and tenth transverse, rather broader than the preceding ones, the terminal double the length of the penultimate.

A peculiar species having the basal joint of the antennæ

rather shorter and the terminal longer than usual. The head is rather broader than that of *S. longicollis* and the eyes are more distant from the base. The elytra are slightly shorter, have longer dorsal striæ, and instead of being somewhat transversely convex are quite flat. The thorax is rather shorter, with different sculpture, and its central groove is distinctive.

♀. Length $2\frac{1}{3}$; breadth nearly $\frac{1}{2}$ mm.

Timaru. A single specimen found by Mr. W. L. Wallace.

3371. *Sagola auripila*, sp. n.

Subdepressed, elongate, shining; with conspicuous, suberect, bright golden pubescence; fulvo-rufous, lateral margins of the hind body, and a median spot on its third exposed segment, infuscate, legs and antennæ fulvescent, palpi and tarsi yellow.

*Head* rather shorter and narrower than the thorax, only very slightly rounded behind the prominent eyes, sinuously narrowed in front of them, with obtuse hind angles; frontal channel deep, rather broad, narrowed behind and extending just beyond the back of the eyes, occipital foveæ punctiform but distinct, the antennal tubercles slightly raised and separated in front by a narrow groove. *Thorax* oviform, as long as broad, widest at the middle; median depression subrotundate, basal punctures small and situated close to the angles, lateral foveæ deep but rather short. *Elytra* of equal length and breadth, hardly longer than the thorax, much narrowed towards the base; sutural striæ deep throughout, the dorsal also deep, but short and entire. *Hind body* about double the length of the elytra and evidently broader, the basal three uncovered segments horizontal, somewhat convex, about equally large, with thick lateral margins, the terminal ones paler and deflexed.

*Legs* elongate; tibiæ slightly expanded towards the extremity and distinctly pubescent there.

*Antennæ* fully as long as the head and thorax, with elongate greyish hairs; basal joint not twice as long as broad, second not as stout, oviform, third small, fourth rather larger than third and subglobular; fifth and sixth equal, slightly broader than fourth, contracted apically, seventh and eighth still more contracted and laxly articulated in front, and slightly broader, ninth and tenth transverse, broader than the preceding ones, the terminal conical.

*Underside* with bright yellow pubescence; the basal ventral segment short, second, third, and fourth elongate and

subequal, fifth extremely short and truncate in the middle but considerably prolonged at the sides, sixth in the middle nearly as long as the sides of the fifth, truncate behind, the supplementary short and broad.

The proper position for this species is after *S. tenuis*, 1582, in which, however, the head is more trigonal, the frontal channel is not much larger than the occipital foveæ, and the eyes are almost flat; the thorax is widest before the middle and, therefore, cordiform, and its median depression is oblong; the elytral dorsal striæ are longer, but not so deep and, instead of being entire, are divided; the hind body is shorter, flatter, and very gradually expanded from the base to the extremity of the third visible segment, and the colour and vestiture are manifestly different.

♂. Length 2; breadth $\frac{1}{2}$ mm.

Erua, February 1911. A solitary male specimen is all I could find, during two visits, amongst leaves on the ground at an elevation of about 2400 feet.

### 3372. *Sagola crassicornis*, sp. n.

Slender, elongate, subdepressed, nitid; rufescent, legs and antennæ fusco-fulvous, palpi and tarsi yellow; sparingly covered with distinct, decumbent, elongate, greyish pubescence.

*Head* quite as long as broad, slightly rounded behind the small eyes, rather gradually narrowed anteriorly, antennal tubercles rather flat and broad, separated by a distinct groove; frontal channel moderately broad and deep, extending as far as the back of the eyes, occipital foveæ very distinct and moderately large. *Thorax* suboviform, widest near the middle, rather longer than the head, a third longer than broad; median depression transversely quadrate, basal punctures indistinct, lateral foveæ extending forwards to the middle. *Elytra* slightly curvedly narrowed before the middle, nearly as broad as they are long but not exceeding the thorax in length; sutural striæ distinct, the dorsal small and entire. *Hind body* twice the length of the elytra, the third exposed segment rather longer and broader than the preceding ones, fourth nearly as long as the first and slightly deflexed, the terminal conical.

*Legs* only moderately stout; posterior tibiæ nearly straight and evidently longer than the others, which are slightly curved and dilated towards the extremity; the anterior and intermediate tarsi shorter and thicker than the hind pair.

*Antennæ* shorter than the head and thorax, evidently

incrassate towards the extremity; basal joint red, thick, not much longer than broad, second quadrate, third small, broader than long; joints 4–8 transverse, sixth smaller than fifth, the seventh and eighth distinctly broader than preceding ones; ninth and tenth still broader, eleventh short, as broad as the penultimate.

This most nearly resembles *S. gracilis*, 2473, from Mount Pirongia, but in it (2473) the head differs in shape, being gradually narrowed from the hind angles onwards, and its frontal channel is subquadrate; the thorax is even more elongate and distinctly oviform; the elytra are less narrowed towards the base and have deeper and longer dorsal striæ; the tibiæ are almost all alike; the basal joint of the antennæ is longer, the second broadly ovate, and joints 3–6 are small and moniliform. These are not mere sexual disparities, as both specimens are males.

Length $1\frac{2}{3}$; breadth $\frac{1}{3}$ mm.

Raurimu, Main Trunk Line, elevation 1900 feet. A solitary individual found in January 1910. When I went again the following year the collecting-place had been destroyed by fire.

3373. *Sagola guinnessi*, sp. n.

Subdepressed, elongate, shining; head and thorax light rufous, the elytra, hind body, and antennæ rufo-fulvous, legs more flavescent, palpi and tarsi yellow; pubescence yellow, elongate, suberect behind.

*Head* fully as long as broad, nearly straight and just perceptibly narrowed behind the moderately large eyes, obliquely and slightly narrowed anteriorly, antennal tubercles moderately elevated, separated in front by a linear groove; it is rather flat along the middle, with small punctiform occipital foveæ, the frontal channel is deep and subquadrate and scarcely extends as far as the front of the eyes, which are equidistant from the antennæ and basal angles. *Thorax* about as long as broad, subcordate, widest just before the middle; median depression almost rotundate, basal punctures small, lateral foveæ deep but hardly extending halfway along the sides. *Elytra* slightly longer than broad, a third longer than the thorax, gently narrowed before the middle, nearly flat; sutural striæ well marked, minutely punctiform at the base, with a basal puncture alongside each, dorsal striæ divided, consisting of a puncture in front and elongate impression. *Hind body* quite as long as the elytra, subparallel; segments 2–4 subequal, slightly increasing in length, the first short.

*Legs* elongate, tibiæ gradually expanded, the posterior with a short straight calcar alongside the inner extremity.

*Antennæ* as long as the head and thorax, stout, with distinct elongate pubescence; basal joint red, punctate, its length almost double the breadth, second oviform half the length of the first, third subglobular but not very much smaller than second; joints 4–6 subglobular, and as broad as the second, seventh and eighth very slightly broader and laxly articulated, ninth and tenth still broader and quite transverse, eleventh conical, about twice the length of the tenth.

*Underside* distinctly pubescent. Head with a transverse depression in front of the eyes. Metasternum with an oviform impression behind. Ventral segments 3–5 nearly equal, sixth subtriangular.

The form of the nearly plane head with its short and broad frontal channel, the subrotundate median fossa of the thorax, and the subparallel outline from the base of the elytra to the extremity of the abdomen, taken together, will enable it to be separated from others of about equal size.

♀. Length $2\frac{1}{3}$; breadth quite $\frac{1}{2}$ mm.

Erua. I found one amongst leaf-mould collected for me in March 1910 by Mr. W. J. Guinness, and as the consignment contained some other small but interesting species, I have attached his name to this one.

### 3374. *Sagola connata*, sp. n.

Slender, elongate, subdepressed, glossy; with elongate, decumbent, greyish pubescence; fulvescent, but with the elytral apices infuscate, and the third and fourth dorsal segments with blackish spots, that on the centre of the former being large and oblong, on the other much smaller; legs and antennæ fulvous, tarsi and palpi yellow.

*Head* smaller than the thorax, hardly longer than broad, nearly straight behind the slightly convex eyes, obliquely narrowed anteriorly; frontal channel short and subquadrate, not extending beyond the middle of the eyes, occipital foveæ punctiform but distinct; antennal tubercles not separated, but forming an evident ridge across the forehead. *Thorax* oviform, widest near the middle, rather longer than broad; median depression subrotundate, basal punctures minute, lateral foveæ small, not prolonged as far as the middle. *Elytra* hardly longer than the thorax, a good deal narrowed towards the base; sutural striæ well developed, the dorsal minute and punctiform. *Hind body* quite glossy, about a third longer than the elytra, gradually expanded backwards

as far as the extremity of the third visible segment, from which point to the base of the elytra the shape is almost uninterruptedly cuneiform; the second exposed segment is larger than the first, the third still larger; fourth and fifth deflexed, the former barely half the length of the third.

*Legs* moderately elongate; posterior tibiæ slender near the base, but more distinctly curved and dilated outwardly, below the middle, than the other pairs.

* *Antennæ* as long as the head and thorax, with elongate slender hairs; basal joint thick, rather longer than broad, oblong-oval, second of nearly similar form but smaller; joints 3, 4, and 6 very small and subglobular, fifth rather larger but of the same shape; seventh and eighth broader than long, but scarcely double the size of the sixth, the ninth and tenth broader, strongly transverse, eleventh subconical, evidently longer than tenth.

*Underside* obscurely fulvescent, the apex of the second and third segments and an oblong spot on the fourth infuscate; pubescence distinct, greyish. Head with an incurved depression before the eyes. Prosternum strongly incurved in front. Metasternum rather short and convex. Abdomen elongate, nearly half the entire length of the body, basal segment hidden by the femora, second and third about equal, both rather large, fourth quite a third longer than either of the preceding ones, gradually expanded apically, fifth half the length of the fourth; the sixth nearly as long as the fifth at the sides, its deep, somewhat angulate emargination occupied by the broadly rotundate supplementary segment.

The connate antennal tubercles at once remove this from the immediate neighbourhood of 1582 and 2473; the latter, *S. gracilis*, is most like this species, which, however, has a much shorter and differently formed head and shorter thorax, the elytra are rather longer, more narrowed towards the base, and the usual dorsal striæ are represented by minute punctiform impressions only, the hind body is shorter and wedge-shaped, and the antennæ are more elongate and differ structurally.

♂. Length 1⅓; breadth ⅓ mm.

Erua, January 1911. A single male specimen is all I could find.

### 3375. *Sagola longipennis*, sp. n.

Elongate, slender, subdepressed, shining; fusco-fulvous, legs and antennæ fulvescent, palpi and tarsi yellow;

pubescence greyish, decumbent, most distinct on the hind body and sides of the elytra.

*Head* smaller than the thorax, straight behind the eyes, with subrectangular angles, slightly narrowed in front, antennal tubercles connate and forming a thick frontal margin; frontal fossa deep, oblong, and extending as far as the middle of the eyes, occipital foveæ well marked. *Eyes* rather large, moderately prominent, situated at the middle. *Thorax* rather longer than broad, oviform, rounded and widest at the middle and there a little broader than the head, eyes included; median depression subrotundate, basal punctures small, lateral foveæ deep, prolonged nearly to the middle. *Elytra* oblong, nearly twice the length of the thorax, very slightly narrowed towards the shoulders, curvedly narrowed near the apices; sutural striæ deep but not broad, the dorsal also deep, apparently entire, about a third of the whole length. *Hind body* about as long as the elytra, slightly expanded near the middle, third segment larger than the second and nearly double the length of the first, the terminal ones somewhat deflexed.

*Legs* rather slender, tibiæ slightly curvedly dilated below the middle; tarsi moderately elongate.

*Antennæ* rather slender, as long as the head and thorax; basal joint rather short, oblong-oval, the next of similar form but not as large; fifth joint distinctly larger than the third, fourth, or sixth, which are equally small and subglobular; seventh and eighth a little larger than the fifth, contracted apically; ninth and tenth transverse, evidently broader than the preceding ones; eleventh largest, but, owing to the usual apical appendage being indistinct, it appears to be quadrate instead of conical.

A glance at the eyes, elongate elytra, with longish striæ in place of minute dorsal ones, and the shorter hind body, will lead to its identification.

Length $1\frac{1}{3}$; breadth $\frac{1}{3}$ mm.

Erua, altitude 2400 feet. Unique, found in February 1911.

*Obs.* These, *S. connata* and *S. longipennis*, together with the other minute slender species, whilst exhibiting a sort of family likeness, do not accord structurally. If I made a new genus for these two the others would still be isolated, and as all are represented by single specimens only I do not deem it advisable to risk injury in manipulation. They are placed in two separate sections of the genus.

LXI.—*Descriptions of new Species of Lepidoptera from Tropical Africa.* By G. T. Bethune-Baker, F.L.S., F.Z.S.

I have continued my usual method of taking the measurements of the new species described in the following pages, viz. measuring from the centre of the thorax to the apex of the wing and doubling it.

## Rhopalocera.

### *Lycæninæ.*

*Castalius anomalogramma*, sp. n.

♂. Frons pure white, collar dark grey, patagia pale grey (hoary). Both wings pure white, with blackish markings. Primaries with the base, costa, apex, and tornus blackish grey; a slight wedge-shape small mark of hoary in the basal patch; cell closed with a short dark bar; a subapical, even, curved bar from the costa to vein 3, another shorter bar shifted inwards from vein 3 to the inner margin adjoining the tornal dark area. Secondaries with basal marks showing through, terminal area broadly sooty grey, in front of which is an interrupted dark line consisting of three short stripes. Underside: primaries with a very oblique dark basal and median dash, two spots at the end of the latter; a curved subapical bar invaded by a short bar in its middle, a short bar to the inner margin below it, a subterminal fine dark line, a terminal row of dark dots. Secondaries with four basal dark bars, the subterminal interrupted line consisting of three dashes as on the upperside, followed by a fine continuous brown line, beyond which is a terminal series of black dots, ending in a black eye-spot at the tail with metallic-blue edging, followed by a similar one at the anal angle.

Expanse 24 mm.

*Hab.* Senegal.

Type in my collection.

### *Hesperinæ.*

*Caprona cassualalla*, sp. n.

♂. Both wings greyish brown. Primaries with a median series of diaphanous spots from the costa to vein 2, gradually increasing in size; below these on the fold are two more

such spots, the upper one of the two a minute bar, the lower one a small squarish spot; in the angle of vein 3 is a small diaphanous dot; beyond these is a dark wedge-shaped mark of rough scales; a bar of four small compressed diaphanous spots is on the costa at a quarter from the apex, adjoining which (spots) is a patch of dark rough scales; termen with a pale whitish indefinite line. Secondaries with base and termen broadly russet-brown, edged respectively the one externally and the other internally with an indefinite oblique whitish line, the interspace being pale greyish brown.

Expanse 46 mm.

*Hab.* Cassualalla, N. Angola; July (*Ansorge*).

Type in my collection.

## Heterocera.

### Noctuidæ.

#### *Agrotinæ.*

*Timora multistriata,* sp. n.

♂. Head and collar smoke-grey, thorax paler; abdomen yellowish grey. Legs greyish. Primaries cream-colour, with the lower half of the cell and narrowly below it crimson-red extending nearly to the termen between veins 4 and 5 and also shortly below vein 2; above and below this red stripe is a broad pearly-white stripe, that above it from the middle of the cell to the termen, that below all along the fold; vein 6 finely bordered with red above, and over this one or two fine short reddish radiations; below vein 1 *a* the inner margin is broadly reddish. Secondaries silvery white, with fringes slightly pink at apex only.

Expanse 26 mm.

*Hab.* Lokoja District (100 miles north).

Type in my collection.

Allied to *T. rubristriata,* Hmpsn., and *T. bivittata,* Wlk.

*Timora unifascia,* sp. n.

♀. Head and thorax chocolate-brown, abdomen paler. Primaries chocolate-brown, with a creamy-white stripe through the outer half of the cell extending nearly to the termen between veins 5 and 6; another fine creamy line below the cell along the fold. Secondaries creamy white, termen tinged with chocolate-colour.

Expanse 31 mm.

*Hab.* Lokoja District (100 miles north).

Type in my collection.

*Adisura callima*, sp. n.

♀. Head and thorax pale dove-grey. Primaries pink, deepening into bright rose-colour along the costa and at the termen; a largish wedge-shaped patch, somewhat indefinite as to its borders, of deep straw-colour beyond the cell. Secondaries pale yellowish, deepening in tone towards the termen, which has a dusky patch below the apex.

Expanse 29 mm.

*Hab.* Malange, W. Africa; December.

Type in my collection.

*Micragrotis cinerosa*, sp. n.

♀. Head and thorax pale tawny. Primaries ash-grey, with a very fine median line, almost scalloped, from which on the fold is emitted an equally fine dark horseshoe outline; orbicular stigma finely outlined in dark brown, reniform stigma less distinctly outlined; postmedian line immediately behind the reniform, very fine and obscure, subcrenulate, followed by two rows of fine dark short dashes; a round ochreous apical patch, surrounded obscurely with reddish; termen broadly ochreous nearly to the termen, with interspersed reddish scales. Secondaries greyish white, with apex broadly pale grey, narrowing along the termen.

Expanse 27 mm.

*Hab.* Nairobi; April (*Jackson*).

Type in my collection.

*Hadeninæ.*

Neuranethes, gen. nov.

Palpi scaled, porrect; frons roughly scaled; eyes round and large; thorax with collar spreading into a crest; patagia somewhat crest-like; metathorax crested; abdomen with no dorsal crests. Antennæ very minutely ciliated. Legs hairy. Neuration: primaries with veins 3 and 5 from near the angle, 4 from the angle, 6 from below the angle, 7 and 8 on a short stalk near cell, 9 and 10 stalked from near the cell and bent down so that 9 touches 7 but does not anastomose, 11 from the cell. Secondaries with 3 and 4 from the angle, 5 obsolescent from below the middle of the discocellulars, 6 and 7 on a short stalk, 8 anastomosing shortly with cell near base.

Type, *Neuranethes angola*, B-B.

*Neuranethes angola*, sp. n.

♂. Head and thorax dark chestnut-brown, abdomen darker brown. Primaries greyish brown, with dark brown markings; two dark marks at base, one in the cell, one above; a dark dash below the fold near the base; median area with a large dark spot on the fold, hollowed out on its inner edge and arched outwards on its exterior margin; a trace of a dark patch above it across the cell to the costa; orbicular very finely outlined; reniform large, pale, edged outwardly by a dark patch; a trace of three dark subapical spots. Secondaries pale whitish grey.

Expanse 32 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet; November (*Ansorge*).

Type in my collection.

AGROTANA, gen. nov.

Palpi upturned, heavily scaled, second segment reaching above centre of frons, third segment minute. Frons disc-like, with a circular raised edge and small horny prominence in the centre; vertex roughly scaled, crest-like collar; patagia slightly raised like crests, otherwise thorax is uncrested; abdomen uncrested. Antennæ lamellate. Legs heavily fringed with hair. Neuration with veins 3 and 5 from near the angle, 4 from the angle, 6 from the angle; 7, 8, 9 stalked, 8 from 9 anastomosing with 10 to form the areole, 11 from the cell. Secondaries with 3 and 4 stalked, 5 obsolescent from below the middle of the discocellulars, 6 and 7 stalked, 8 anastomosing shortly from the base.

Type, *Agrotana jacksoni*, B-B.

*Agrotana jacksoni*, sp. n.

♂. Head, thorax, and abdomen ochreous grey. Primaries pale ochreous cream-colour, sparingly irrorated with slightly darker scales; median line obscure, excurved; postmedian line faint, excurved, outside the pale reniform, orbicular pale, both being obscure; subterminal line distinct, waved; termen finely dark. Secondaries pale cream-colour.

Expanse 26 mm.

*Hab.* Nairobi, B.E. Africa; March (*Jackson*).

Type in my collection.

This is a very *Agrotis*-like species.

*Acronyctinæ.*

*Euplexia pullomedia*, sp. n.

♂. Head and thorax mottled brownish grey, abdomen paler. Primaries: the basal area up to the waved median line having a mottled appearance, with a fine black curved line in the cell; median area dark, especially around the orbicular stigma, which is dark slate-colour; reniform stigma large and white; postmedian line waved, crenulate, area beyond this paler; a fine preterminal lunulated line, with the lunules filled in outwardly with slate-colour. Secondaries white.

Expanse 30 mm.

*Hab.* Nairobi; April (*Jackson*).

Type in my collection.

*Perigea aplecta*, sp. n.

♂. Head and thorax cinnamon-brown, abdomen somewhat paler. Primaries cinnamon-brown, with an obscure trace of a paler basal line, an equally obscure trace of a median line; orbicular stigma small, round, slightly paler than ground-colour; reniform stigma pale, distinct; postmedian line finely crenulate and waved, followed by a row more or less parallel of pale points on the veins, which are finely dark grey from the postmedian line; a subterminal waved pale line; termen darkly dotted. Secondaries pale brownish, with pinkish fringes.

Expanse 36 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet; November (*Ansorge*).

Type in my collection.

*Oligia parathermes*, sp. n.

♂. Head and collar cinnamon-brown, interspersed with dark scales; thorax darker brown; abdomen dark greyish. Primaries darkish brown, tinged with pale cinnamon along the lower margin of the cell; basal line fine, waved, double; median line somewhat excurved, postmedian line excurved beyond the reniform stigma, then receding in a bold curve; a short blackish basal line; an oblique blackish dash below vein 2, its extremity touching the blackish postmedian line; orbicular stigma small, oval, greyish; reniform darkly outlined, with white points in it; subterminal area with a trace of a pale cinnamon interrupted stripe; costa spotted alter-

nately with light and dark. Secondaries pale greyish, with darker termen.

Expanse 24 mm.

*Hab.* Entebbe, Uganda (*Jackson*).

Type in my collection.

*Diparopsis tephragramma*, sp. n.

♂. Head pale pinkish brown, thorax greyer, abdomen creamy. Primaries pale pinkish brown, with a wedge-shaped patch of darkish grey occupying most of the cell and part of the fold; postmedian line pale, even, curved below the costa, then descending obliquely straight to the inner margin; this line is preceded by an irregular dark grey line, and is followed by a broad oblique band of dark grey. Secondaries creamy white.

Expanse 32 mm.

*Hab.* Gunnal, W. Africa; November.

Type in my collection.

*Prodenia metriodes*, sp. n.

♂. Head and thorax pale ochraceous grey, abdomen pale grey. Primaries pale ochraceous grey, with dark markings; a small darkly outlined basal spot, followed by a pale patch with dark scales on its outer edge; median dark line curved and scalloped, palely edged internally, the usual pale "*Prodenia*" mark across the cell, but less conspicuous than usual; reniform distinct, darkly outlined with pale interior edge, filled in darkly with a pale apex; postmedian line irregular, crenulate, palely edged externally, followed immediately by a pale area below vein 3; a dark patch between 3 and 5, above which is a chestnut patch; subterminal line pale dentate, area beyond this chestnut-colour; termen darkly pointed; fringes palely intersected. Secondaries pearly, with termen finely dark.

Expanse 32 mm.

*Hab.* N. Nigeria.

Type in my collection.

*Petilampa homora*, sp. n.

♂. Head, thorax, and abdomen greyish. Primaries uniform shining pale brownish grey, with an indistinct basal line and a pale postmedian line which is highly curved below the costa (almost angled), then receding slightly to the inner margin; a trace of an irregular subterminal line; reniform

stigma slightly paler, but obscure. Secondaries rather paler than primaries, but lustrous in like manner as they are.

Expanse 29 mm.

*Hab.* Nairobi; April (*Jackson*).

Type in my collection.

*Ethiopica melanopa*, sp. n.

♀. Head and thorax sooty black, abdomen grey. Primaries sooty black, with a restricted grey base darkly irrorated; reniform stigma grey, with a small grey costal spot above it; postmedian line broad, grey, very irregular, very obscured in the lower radial area; termen with pale points. Secondaries pale greyish.

Expanse 21 mm.

*Hab.* Lokoja District (100 miles north).

Type in my collection.

*Ethiopica leucostigmata*, sp. n.

♂. Head, thorax, and abdomen brown. Primaries dark brown, tinged with chocolate-colour; a small white dot at the base of the cell; orbicular stigma white, with a cream-coloured pupil having a fine dark iris; reniform white, broken up by fine dark lines into many small spots, the middle being cream-coloured; a trace of an obscure pale interrupted subterminal line; a preterminal row of fine white points. Secondaries white.

Expanse 26 mm.

*Hab.* N'Dalla Tando, 2700 feet; November (*Ansorge*).

Type in my collection.

Near to *E. polyastra*, Hmpsn.

*Ethiopica apicestriata*, sp. n.

♂. Head, thorax, and abdomen dark brown. Primaries dark burnt brown, with a few fine white scales below the middle of the cell and also about the lower angle of the cell; a dark, waved, subcrenulate postmedian line; a shortish, broad, oblique, buff-coloured dash from the apex to the postmedian line. Secondaries darkish brown.

Expanse 24 mm.

*Hab.* Gunnal, W. Africa; November.

Type in my collection.

GORTYNODES, gen. nov.

Proboscis absent, palpi upturned, second segment reaching

to vertex of head, thickly scaled, third segment shortish. Antennæ pectinated with cilia. Frons, lower part naked, upper part roughly scaled; head roughly scaled; collar spreading, with a central pencil crest; patagia spreading into crests; metathorax crested; abdomen smooth. Primaries with costa slightly hollowed in centre, apex weakly rounded; termen evenly rounded. Neuration: vein 3 from just before the angle, 4 from the angle, 5 from midway between angle and middle of discocellulars, 6 from upper angle, 7, 8, and 9 stalked, 10 anastomosing with 8 to form the areole, 11 free from cell. Secondaries with 3 and 4 very shortly stalked, 5 from midway between angle and middle of the discocellulars, 6 and 7 from the upper angle.

Type, *Gortynodes holophœa*, B-B.

*Gortynodes holophœa*, sp. n.

♂. Head, thorax, and abdomen darkish brown. Primaries darkish brown, with all the cell, fold, and postmedian areas darker brown up to the fine double postmedian line, leaving the costa and subterminal and terminal areas slightly paler; across the middle of the cell is a slightly paler brown band acutely angled externally and edged finely on each side with very pale brown; reniform palely edged; termen finely blackish. Secondaries palish brown, with an obscure dark spot at the end of the cell and an obscure postmedian line.

Expanse 28 mm.

*Hab.* Gunnal, W. Africa; November.

Type in my collection.

*Elydna brunneaplagata*, sp. n.

♀. Head, thorax, and abdomen dull brown. Primaries dull brown, the basal half of a mottled appearance; a trace of an irregular antemedian line; postmedian line oblique for the costal half edging the costal patch, then descending in waved crenulations to the inner margin; a large wedge-shaped, reddish-brown, subapical costal patch, with an irregular outline on its external edge; a trace of a subterminal spotted line; termen very finely cream-coloured, preceded by a fine reddish-brown line. Secondaries dull brown.

Expanse 31 mm.

*Hab.* Gunnal, W. Africa; November.

Type in my collection.

Near *E. plagiata*, Wlk.

*Elydna ænictopis*, sp. n.

♂. Head and thorax dark brown, scales more or less tipped with grey, abdomen paler. Primaries dark brown; post-median line obscure, composed of blackish points with a few interspersed grey scales; orbicular and reniform stigmata dark grey; termen with minute white points. Secondaries dirty whitish.

Expanse 30 mm.

*Hab.* N'Dalla Tando, Angola; November (*Ansorge*).

Type in my collection.

*Elydna glaucopis*, sp. n.

♂. Head, thorax, and abdomen dirty brown. Primaries dirty brown, with paler greyish-brown lines; basal line waved and obscure; postmedian line highly projected outwards beyond the cell, almost forming half a parallelogram, receding rapidly below to the inner margin; subterminal line irregular and somewhat obscure; the two stigmata show out darkly. Secondaries dirty whitish.

Expanse 26 mm.

*Hab.* Nairobi; June (*Jackson*).

Type in my collection.

This species bears a superficial likeness to *Athetis glauca*, Hmpsn.

*Elydna percnopis*, sp. n.

♂. Head, thorax, and abdomen greyish brown. Primaries dull brown, with an irregular antemedian dark line; post-median dark line very irregular, strongly crenulate just below the costa; this line is preceded by a more or less erect band of dark shading; subterminal line distinct, with two bold curves; termen finely and palely pointed. Secondaries darkish grey.

Expanse 25 mm.

*Hab.* N'Dalla Tando, 2700 feet; November (*Ansorge*).

Type in my collection.

*Elydna scotopis*, sp. n.

♂. Head, thorax, abdomen, and primaries cinnamon-brown, the latter with a trace of a double basal line; ante-median line double, dark, fine, filled in with pale tawny brown, angled more or less three times; postmedian dark line strongly excurved in the upper radial area, fine, crenulate, with a pale tawny external edging; subterminal line

irregular, rather obscure; termen finely pale, with a fine dark internal edging. Secondaries whitish, with brownish costa, and terminal area slightly brownish.

Expanse 32 mm.

*Hab.* Nairobi; April (*Jackson*).

Type in my collection.

CIRRODIANA, gen. nov.

Proboscis present; palpi upturned, slender, well scaled, second segment reaching to vertex, third moderate. Frons well scaled; eyes large, round; antennæ of male pectinate, branches with fine cilia. Thorax clothed with scales and some hairs, crested in front; legs moderately fringed with coarse hair. Primaries with costa nearly straight, apex slightly rounded, termen moderately erect to vein 4, then rapidly rounded off, slightly scalloped. Neuration with veins 3 and 5 from near the angle, 6 from the upper angle, 9 from 10 anastomosing with 8 to form the areole, 11 from the angle. Secondaries with 3 and 4 from the angle, 5 from well above the angle fairly strong, 6 and 7 stalked, 8 anastomosing with the cell for nearly a quarter.

Type, *Cirrodiana bella*, B-B.

*Cirrodiana bella*, sp. n.

♂. Head and thorax pink, abdomen dirty ochreous. Primaries dull pink up to the fine, pale, deeply waved, and irregular postmedian line, with the cell pale olive; the oval orbicular and the reniform stigmata palely edged distinct olive, the latter with pink scales and a fine whitish dash in it; area beyond the postmedian line pale olive. Secondaries whitish grey, tinged with pink and olive.

Expanse 36 mm.

*Hab.* Malange, West Africa; October 1909.

Type in my collection.

PARALOPHATA, gen. nov.

Proboscis absent. Palpi porrect, small, second segment not reaching a quarter up frons, scaled, end segment minute, depressed; frons scaled, prominently rounded; no corneous plate; eyes round, moderate size; antennæ of male bipectinate, female shortly bipectinate; collar long, spreading into a crest; abdomen with no dorsal crests; tibiæ hairy. Primaries broad, apex rounded, almost acute in the termen; termen strongly scalloped, rounded, excavated on fold to the

tornus. Neuration: primaries with vein 3 almost waved, rising near the angle, 4 from the angle, 5 from above the angle, highly depressed for its basal third, 6 practically from the upper angle; 7, 8, 9, and 10 stalked, 7 at a third between angle and apex, 10 at a half, 8 and 9 near apex; 11 free from cell. Secondaries with 3 and 4 from the angle, 5 from below the middle of the discocellulars fairly strong, 6 and 7 stalked, 8 anastomosing shortly near cell.

Type, *Paralophata ansorgei*, B-B.

*Paralophata ansorgei*, sp. n.

♂. Head and frons tawny, collar lemon-yellow, palpi tawny, thorax lemon-yellow, patagia tipped with tawny. Primaries lemon-yellow, base of costa with a short brown dash; a broad short dash occupying the inner margin below vein 1 *a* at the base, a small brown dot in the middle of the cell, with another below it on the fold; a trace of two dots closing the cell; a fine interrupted postmedian line angled outwardly below the costa and waved, followed closely by a second precisely similar line; termen and terminal area occupied by a largish irregular brown patch barely extending to the apex or tornus. Secondaries dirty straw-yellow, with terminal area broadly slightly darker.

♀. Exactly like the male.

Expanse, ♂ 42, ♀ 50 mm.

*Hab.* N'Dalla Tando, 2700 feet; November (*Ansorge*).

Types in my collection.

*Phalerodes pulchra*, sp. n.

♂. Head and thorax lavender-grey, thorax with creamy patagia and dark lavender-grey metathorax; abdomen greyish. Primaries with costa broadly lavender-grey, broadest in centre, tapering off towards the apex; reniform pinkish grey, with a double pale pinkish cream-coloured spot below it; upper part of fold and lower radial area very pale olive-grey, lower part of fold pinkish ochreous, inner margin with a double fine dark line on its outer half; upper radial area cream-colour, bordered on its lower edge at vein 4 by a double, dark, quite straight line. Secondaries pearly white.

Expanse 30 mm.

*Hab.* N'Dalla Tando, 2700 feet; October (*Ansorge*).

Type in my collection.

*Ramesodes nycteris*, sp. n.

♂. Head, thorax, and abdomen dull brown. Primaries dark madder-brown, with the lower edge of the cell rather paler, extending in two palish rays along veins 4 and 5 to the termen; postmedian line palely edged, receding very rapidly from vein 4 to below 2, then descending to the inner margin in an erect double scallop; costa to vein 6 from the end of the cell to the apex dark slate-grey; subterminal area below this paler brown to the pale ray. Secondaries: basal half white, outer half dark grey.

Expanse 34 mm.

*Hab.* Malange, W. Africa.

Type in my collection.

*Phragmatiphila connexa*, sp. n.

♂. Head, thorax, and abdomen brown. Primaries clear brown, with a fine, dark, irregular basal line; median line fine, very irregular, projected outwards on the fold; orbicular and reniform stigmata pale and distinct; postmedian line obscure, very fine, crenulate, the area from the median to the postmedian line somewhat darker brown; a fine cream-coloured subterminal line, distinct in the tornal area, evanescent as it approaches the apex; this line is surrounded by a somewhat darker stripe of brown; termen with fine dark scallops. Secondaries pale brown.

Expanse 34 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet; November (*Ansorge*).

Type in my collection.

*Acrapex brunneosa*, sp. n.

♂. Head, thorax, and abdomen dirty greyish brown, legs and pectus the same colour. Primaries dirty greyish brown, with a broad paler area both along the fold and in the cell, the latter increasing in width slightly and ascending to the apex; end of cell marked by a pale small angled spot, beyond which is a dark dotted line slightly oblique and waved; an obscure line of dark shading near the termen roughly parallel with the dotted line; termen with fine dark internervular dashes. Secondaries uniform sooty grey.

Expanse 24 mm.

*Hab.* N'Dalla Tando, 2700 feet; November (*Ansorge*).

Type in my collection.

*Acrapex ochracea*, sp. n.

♂. Head and thorax tawny ochraceous, abdomen ochreous grey. Primaries dirty ochreous, with a paler streak in the cell ascending up to the apex, the outer edge of the ascending portion with a row of several blackish dots; median vein irrorated with dark scales; termen with fine dark internervular dashes. Secondaries whitish grey for the basal half, slightly darker towards the termen.

Expanse 27 mm.

*Hab.* Nairobi; June (*Jackson*).

Type in my collection.

*Sesamia mediastriga*, sp. n.

♂. Head and thorax deep creamy ochreous; abdomen greyish ochreous. Primaries ochreous, very finely irrorated more or less with grey; a trace of a darker line of scales along the median vein; cell closed by a fine dark dash, succeeded by a dark dot; a trace of a postmedian series of obscure dark dots; termen finely dark, preceded by an indefinite area of slightly darker shading than the ground-colour. Secondaries pure white.

Expanse 31–32 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet.

Type in my collection.

*Enispa acutalineata*, sp. n.

♂. Head whitish, thorax grey, abdomen paler. Primaries whitish, with a broad, median, dark grey erect dash, not extending to the costa; two black points at end of cell; a dark grey postmedian line, oblique and deeply angled about vein 7, followed by a second finer one; from base up to the termen the ground is greyish, somewhat mottled and clouded except between veins 3 and 4, where there is a small whitish terminal patch. Secondaries dusted with grey; a dark small spot in the cell, just beyond which is a dark brown waved line, followed by a second finer one, the area beyond this being entirely dusted with pale tawny grey.

Expanse 27 mm.

*Hab.* Malange, W. Africa; November.

Type in my collection.

ENISPADES, gen. nov.

Proboscis of moderate size; palpi upturned, reaching

beyond the middle of the frons, scaled ; third segment short, frons roughly scaled ; eyes round, prominent ; antennæ almost simple, a trace of very short fine cilia near base ; tibiæ not hairy ; spurs long. Primaries with apex produced and acute, termen produced at vein 4. Neuration with veins 3 and 5 from near angle, 6 from just below upper angle ; 7, 8, and 9 stalked ; 10 from cell, with a bar to 8 forming a longish areole ; 11 free from cell. Secondaries with veins 3 and 4 from the angle, 5 from well above the angle, 6 and 7 from the angle, 8 bent down to touch cell, anastomosis not quite complete.

Type, *Enispades angola*, B-B.

*Enispades angola*, sp. n.

♂. Head, thorax, and abdomen ochreous grey. Both wings ochreous grey, with a trace of a pink tinge, with darker grey markings. Primaries with a trace of a median line ; a large grey spot at end of cell, sometimes only present in outline ; postmedian line oblique, deeply and obtusely angled below the costa, followed directly by a second very fine similar line ; a row of subterminal fine dots roughly parallel with the termen, which latter has fine blackish points. Secondaries with a waved postmedian line, followed by a second fine one ; a trace of a row of subterminal dots as in the primaries.

Expanse 21 mm.

*Hab.* N'Dalla Tando, 2700 feet ; December (*Ansorge*).

Type in my collection.

*Enispades nigropunctata*, sp. n.

♂. Palpi sooty black ; head and thorax whitish ; abdomen grey. Both wings whitish, with dark markings. Primaries with a blackish spot at the base of the costa, followed by a second further along ; a fine dark angled median line, ending in the second costal spot ; a bare trace of a postmedian line, followed by a crenulate line with blackish points, between which and the tornus the fold is darkly dusted ; termen finely dark, with a small triangular patch between veins 4 and 7 ; fringe white, with black intersections. Secondaries with the area beyond the middle greyish ; termen with dark dashes ; fringe whitish.

Expanse 21 mm.

*Hab.* N'Dalla Tando, 2700 feet ; November (*Ansorge*).

Type in my collection.

*Eublemma brunneosa*, sp. n.

♀. Head, thorax, and abdomen cinnamon-brown. Primaries: basal third cinnamon-brown, terminated by a broad defined band of dark velvety brown right across the wing, and tapering off from the lower end of the cell to the costa; reniform deep blackish brown; this is followed by a pale grey, fine, exangled postmedian line (the angle being filled in with mottled cinnamon-brown), edged indefinitely with darkish tawny brown, which continues up to the termen and in which is a fine, grey, waved subterminal line; fringes grey, the outer half being paler than the inner half. Secondaries warm brown, broadly darker in the terminal area.

Expanse 18 mm.

*Hab.* Nairobi, B.E. Africa (*Jackson*).

Type in my collection.

*Eublemma bicolora*, sp. n.

♂. Head, thorax, and abdomen ochreous. Primaries ochreous, with a broad, irregular, brown median area, the costal part being invaded by the pale reniform, beyond which is a costal wedge-shaped brown patch; termen finely brown. Secondaries darkish grey.

Expanse 18 mm.

*Hab.* Nairobi, B.E. Africa (*Jackson*).

Type in my collection.

*Eublemma crenularia*, sp. n.

♂. Head tawny ochreous, thorax and abdomen paler ochreous. Primaries greyish ochreous, with tawny grey marks; a deeply crenulate antemedian pale line, followed by a similar median line, neither extending below the cell, the interspaces being filled in with greyish; a deeply excurved and highly crenulate postmedian double tawny line, the narrow interspace filled in with pale grey, the reniform being occupied by an indefinite tawny patch; apical area pale grey, the costal portion having four dark short tawny dashes. Secondaries brownish grey.

Expanse 19 mm.

*Hab.* Malange, Portuguese W. Africa; October.

Type in my collection.

*Eublemma basiplagata*, sp. n.

♂. Head, thorax, and abdomen dull brown. Primaries

with base very restricted greyish brown, terminated in a very irregular fine dark line, from whence up to beyond the cell the colour is dark brown, terminating abruptly and obliquely; area beyond this pale brown; there is a trace of a very dark dash in the middle of the cell, and the reniform is similarly outlined. Secondaries greyish brown.

Expanse 22 mm.

*Hab.* Gunnal, W. Africa; November.

Type in my collection.

*Eublemma nyctopa*, sp. n.

♂. Head and thorax sooty grey, abdomen paler. Primaries sooty brown, with a subbasal double dark line, the outer line being arched outwards and forming with the inner line an incomplete D mark; median line fine, dark, twice-angled, followed closely by a second similar and parallel line; termen finely dark. Secondaries pale grey.

Expanse 20 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet; October (*Ansorge*).

Type in my collection.

*Eublemma scotopis*, sp. n.

Head, thorax, and abdomen dark madder-brown. Primaries dark madder-brown, basal half very dark, ending irregularly, outer half greyer in the postmedian area, but becoming very dark towards the termen; fringes pale grey. Secondaries dark, somewhat similarly divided as the primaries.

Expanse 28 mm.

*Hab.* Lokoja District (100 miles north).

Type in my collection.

*Eublemma nigribasis*, sp. n.

♂. Head, thorax, and abdomen dark brown. Primaries with basal third blackish brown, terminal two-thirds creamy, the terminal area being broadly mottled dusky. Secondaries dark grey.

Expanse 20 mm.

*Hab.* Malange, Portuguese W. Africa; November.

Type in my collection.

EUBLEMMARA, gen. nov.

Palpi thickly scaled, second segment reaching up to vertex;

end segment short, also scaled ; antennæ minutely ciliate ; frons not prominent, scaled ; proboscis poorly developed. Neuration : primaries with veins 3 and 5 from near angle, 4 from the angle, 6 and 7 free from the cell, 8 and 9 stalked on a long stem ; a bar from 10 to 9 to form the areole ; 11 from cell. Secondaries with 3 and 4 from the angle, 5 from directly above the angle, 6 and 7 from the upper angle, 8 anastomosing with cell shortly at base. Legs : mid tibiæ with one pair of long spurs, hind with two pairs of long spurs.

Type, *Eublemmara tandoana*, B-B.

*Eublemmara tandoana*, sp. n.

♂. Head and thorax blackish brown, abdomen paler. Primaries uniform blackish brown, with a single creamy spot at the end of the cell. Secondaries sooty grey.

Expanse 18 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet ; November and December (*Ansorge*).

Type in my collection.

*Metasada fuliginaria*, sp. n.

♂. Head and thorax very dark purplish brown, abdomen paler. Primaries dark purplish brown, with a broad, irregular, darker antemedian stripe, followed by a similar uneven median stripe ; postmedian line dark, angled several times ; an irregular indefinite subterminal stripe of dark shading ; termen darkly pointed ; a small pale spot at the end of cell. Secondaries dark sooty grey.

♀. Exactly like the male.

Expanse, ♂ 20, ♀ 24 mm.

*Hab.* Gunnal, Portuguese W. Africa ; November.

Types in my collection.

*Corgatha arcuata*, sp. n.

♂. Head, thorax, and abdomen ochreous grey. Primaries ochreous grey, with very fine dusting of darker grey ; a blackish dot in the cell ; a broad tapering blackish median dash from the inner margin to the upper angle of the cell, edged outwardly by a broad oblique band of ochreous grey up to the costa ; a bright cream curved subterminal line from the apex to the inner margin, edged on each side with dark brown ; beyond the outer edging a broad indefinite band of dark shading ; termen with internervular dark dots. Secondaries creamy, with a trace of two median short lines ; an

oblique broad dark subterminal line, preceded by a finer one and succeeded by a broad band of darkish shading; termen with a fine dark line.

Expanse 22–26 mm.

*Hab.* Nairobi, B.E. Africa; July (*Jackson*).

Type in my collection.

*Ozarba epimochla*, sp. n.

♂. Head, thorax, and abdomen greyish brown. Primaries greyish brown, with a waved median dark stripe and a similar postmedian one; there is also a trace of a basal stripe; the postmedian stripe is broad and indefinite as to its outer area; a trace of a pale scalloped line on the termen. Secondaries dark grey.

Expanse 22 mm.

*Hab.* Lokoja District (100 miles north).

Type in my collection.

*Xanthograpta brunneaplaga*, sp. n.

♂. Head, thorax, and abdomen ochreous grey. Primaries ochreous grey, with a trace of a broad darker median area up to the cell, the area in the cell and up to the costa between the position of the orbicular and reniform stigmata filled in with dark brown, darkest in the cell; a subapical similar-coloured costal patch; a trace of a subterminal pale line. Secondaries very pale grey.

Expanse 23 mm.

*Hab.* Gunnal, Portuguese W. Africa; November.

Type in my collection.

*Eustrotia loxosema*, sp. n.

♂. Frons greyish; thorax ochreous mixed with grey; abdomen ochreous. Primaries with base and median area ochreous, greyish on the costa, bordered obliquely up to the apex by a pale stripe, which is edged by a broad wedge-shaped mark of lilac-grey; beyond this the whole of the area is darkly clouded, leaving the tornus paler than the rest of this area. Secondaries dirty grey.

Expanse 18 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet; November (*Ansorge*).

Type in my collection.

*Eustrotia cumalinea*, sp. n.

♂. Head, thorax, and abdomen ochreous grey. Primaries

pinkish grey mixed with olive in parts, especially below the cell; the postmedian area beyond the cell has a radiated appearance; subterminal line pale, waved, bent back below the apex and receding basewards below the costa to about the end of the cell, followed by two faint lines in a pale area, which is bordered by a grey stripe, edged first finely with creamy and then with olive; the cell is closed by a fine dark dash. Secondaries pale grey, darker towards the termen.

Expanse 24 mm.

*Hab.* Nairobi, B.E. Africa; March.

Type in my collection.

*Eustrotia bella*, sp. n.

♂. Head and thorax madder-grey, abdomen tawny ochreous. Primaries with the basal and median area reddish ochreous, edged by a more or less wedge-shaped mark of madder-grey, which is finely edged all round except on the inner margin with white; from this line the whole of the terminal area is dark purplish grey, with two more or less distinct eye-spots, one at the tornus and one in the upper radial area; the tornal spot is indistinct and grey, the radial one is pinkish ochreous on the left wing and greyish on the right wing, the apex being tipped with dark chocolate, edged below with white. Secondaries brownish grey.

Expanse 16 mm.

*Hab.* Gunnal, Portuguese W. Africa; October.

Type in my collection.

This species is near *E. loxosema*, but the shape and colour of the basal area and the markings of the terminal area are different.

*Cardiosace citrelinea*, sp. n.

♂. Head, frons, and thorax pure white, abdomen greyish. Primaries pure white, with a median curved citron-yellow line having a grey spot on its inner edge on the inner margin, and another small grey spot nearer the base in the cell, two grey spots in the cell beyond the median line; postmedian line citron-yellow, excurved in the upper radial area, beyond this line the area is lead-grey with a deep reddish apical spot, and some citron-yellow on the termen in the tornal area; termen finely dark with a fine white inner edging. Fringes whitish. Secondaries white, with apex greyish.

Expanse 20 mm.

*Hab.* N'Dalla Tando (Angola), 2700 feet; November (*Ansorge*).

Type in my collection.

A common and very uniform species.

*Cardiosace callima*, sp. n.

♂. Head, thorax, and abdomen pure white. Primaries pure white, with a median exangled lemon-yellow line, beyond which are two grey spots, one in the cell and one beyond it; inner marginal area from median line into tornus very broadly (nearly half the width of wing) lead-grey clouded with olive; terminal area very broadly lead-grey and much interspersed with olive, a rectangular broad dash of deep olive from the spot outside the cell runs into the terminal area; termen white, darkly spotted between the veins. Secondaries pure white.

Expanse 24 mm.

*Hab.* N'Dalla Tando (Angola), 2700 feet; November (*Ansorge*).

Type in my collection.

*Tarache anomoiota*, sp. n.

♂. Head and thorax whitish, abdomen ochreous. Primaries whitish in the basal area, with a small blackish costal spot near the base; median area blackish arched outwardly on its inner margin, edged outwardly by an oblique white irregular line; a wedge-shaped patch of white in the post-median costal area up to the apex, the rest of the wing very dark brownish grey, with a small white spot at the tornus. Fringes blackish slightly tessellated with white. Secondaries pale transparent grey, darker towards the apex.

Expanse 24 mm.

*Hab.* Gunnal, Portuguese W. Africa; November.

Type in my collection.

*Tarache variegata*, sp. n.

♀. Head pale grey, thorax and abdomen brownish grey. Primaries with the base grey, terminated by an irregular and angled white line; median area dark grey, paler on the fold, with the reniform stigma distinct, encircled with white on its outer margin, from the reniform an oblique whitish dash to the apex; postmedian line very irregular, white, beyond which the area is darkish grey, the subterminal line, which

is very irregular, is white at the apex and tornus and dark between. Secondaries dark grey.

Expanse 24 mm.

*Hab.* Malange, Portuguese W. Africa; November.

Type in my collection.

*Tarache nephata*, sp. n.

♀. Head, thorax, and abdomen olive-grey, metathorax tipped with creamy. Primaries with the basal area to two-thirds along the costa, and a fifth along the inner margin, olive-grey, somewhat mottled with an antemedian paler line, this area is edged by an oblique broad white irregular band, which is again edged irregularly by dark olive-grey, but not extending to the costa, the rest of the wing is purplish grey with a trace of a postmedian line strongly excurved in the upper radial area; subterminal line irregular, composed of reddish uneven spots edged outwardly by a fine creamy line; termen darkly dotted. Fringes grey, whitish in the lower radial area. Secondaries dark brownish grey, with whitish-grey fringes.

Expanse 28 mm.

*Hab.* Lokoja District (100 miles north).

Type in my collection.

*Eutelianæ.*

*Eutelia malanga*, sp. n.

♂. Head and thorax lilac-grey. Both wings grey tinged with lilac. Primaries with an oblique deep purple-brown short dash on the inner margin near the base, behind which the ground is darker followed by a broad deeply curved cream-coloured mark across the fold, this is edged above by a deep purple-brown curved stripe to the termen, apex and termen creamy colour to this stripe, as also slightly below it tapering into the tornus, where there is a small deep brown mark.

Expanse 26 mm.

*Hab.* Malange, Portuguese W. Africa.

Type in my collection.

Near *E. leucodelta*, Hmpsn.

*Eutelia adoxodes*, sp. n.

Head, thorax, and abdomen brownish grey. Both wings greyish brown. Primaries with a darker median area, edged

laterally by obscure still darker lines, subterminal area slightly darker than the median area, with a subapical costal dark small patch palely edged.

Expanse 34 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet; November (*Ansorge*).

Type in my collection.

### *Stictopterinæ.*

### *Gigantoceras adoxodes*, sp. n.

♂. Head, thorax, and abdomen greenish grey. Primaries greenish grey, with basal area darker and edged by the antemedian fine dark line, a fine dark serrate line crosses the wing at the end of the cell; apical area darkly clouded, a trace of a subterminal line of cream-colour fairly distinct in the lower radial area and shifted inwards on the fold; a terminal series of dark lunules edged internally with cream-colour. Secondaries grey at base, dark grey for the terminal half.

Expanse 34 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet; October (*Ansorge*).

Type in my collection.

### *Sarrothripinæ.*

### *Plotheia ianthina*, sp. n.

♂. Head and thorax lilac-grey, abdomen grey. Primaries lilac-grey for the central half, getting tawny towards the fold; a dark tawny, angled, incomplete, antemedian line not extending into the fold; a tawny postmedian irregular line palely edged, which edging is followed by a grey line; reniform stigma tawny, beyond this the apical area is silvery lilac-grey, and the tornal area tawny. Secondaries pure white.

Expanse 22 mm.

*Hab.* Gunnal, Portuguese W. Africa.

Type in my collection.

### Lophotagonia, gen. nov.

Palpi with end segment long and porrect; antennæ with very minute cilia, nearly simple. Hind leg with tibial spines almost as long as the tibiæ, arising from near the femoral joint. Neuration: primaries with veins 3 and 5

from near the angle, 4 from the angle, 6 from the upper angle, 7 highly arched near the cell, a short obsolescent bar from 8 to form the long areole, 8, 9, and 10 stalked, 8 and 9 close to the apex, 10 at a third from the cell, 11 from the cell. Secondaries with 3 and 4 from the angle, 5 absent, 6 from the angle, 7 from the cell, 8 anastomosing shortly with the cell. Secondaries with anal angle distorted and emitting a strong tuft of curly hairs.

Type, *Lophotagonia bostrycodes*, B-B.

*Lophotagonia bostrycodes*, sp. n.

♂. Head and thorax whitish grey, abdomen darker grey. Primaries with basal two-thirds whitish, terminal third lilac and ochreous grey; an interrupted fine dark basal line sharply serrate on the costa; median line fine, very irregular, postmedian line more irregular, very oblique for the costal third, the fold between these two lines filled in with grey; a fine, serrate, irregular, white subterminal line in the darker area, apex with a small dash of white. Fringes intercepted with grey. Secondaries white for the basal two-thirds, grey for the apical third, anal tuft black.

Expanse 22 mm.

*Hab.* Gunnal, Portuguese W. Africa; November.

Type in my collection.

*Catocalinæ.*

*Chalciope cumamita*, sp. n.

♂. Head and thorax pinkish grey; collar barred with darker ochreous grey, abdomen grey. Primaries grey, tinged with lilac in parts; costa darker grey, a broad scimitar-shaped dark velvety-brown dash edged with cream-colour in the fold, above the end of it another short pale dash, finely edged first with dark brown then with cream-colour; into this, nearer the base, runs another similar but paler dash; postmedian area composed of a series of oblique very fine wavy lines, edged externally by a broad stripe of olive-brown, shortly but deeply excurved at its centre and edged internally with cream-colour, beyond this the termen is clouded and with several wavy lines, a subterminal very fine dark line; termen finely cream-colour. Secondaries cream-colour, terminal third dark grey; termen finely whitish, crenulate.

Expanse 39 mm.

*Hab.* Elburgon Railway Station, B.E. Africa; July.

Type in my collection.

*Aedia xanthophaës*, sp. n.

♂. Head and thorax dirty grey. Primaries yellowish cream-colour, with a basal interrupted indefinite black dash on the fold; costa very finely blackish, a subbasal blackish spot; median line black, wavy, very fine, followed by a second more obscure one just in front of the reniform stigma, which latter is pale and obscure. Postmedian line dark grey, subcrenulate, excurved in the upper radial area; beyond this line the area is greenish grey, with a subterminal row of fine obscure spear-head spots, and a short fine black dash between veins 3 and 4; termen finely black and deeply crenulate. Secondaries with the basal half white, the outer half blackish.

Expanse 34 mm.

*Hab.* Gunnal, Portuguese W. Africa; November.

Type in my collection.

*Aedia melanophaës*, sp. n.

♂. Head, thorax, and abdomen dark slate-grey. Primaries very dark slate-grey; median line black, fine, trebly exangled, immediately followed by a fine black figure 3 in the centre of the wing; reniform large, slightly tawny at its external side, finely edged with black; postmedian line sharply defined, crenulate, black, receding basewards below vein 3, the least trace of a subterminal line, dark internally, tawny externally; termen finely blackish. Secondaries with the basal portion white, costa and terminal half sooty grey.

Expanse 38 mm.

*Hab.* Gunnal, Portuguese W. Africa; November.

Type in my collection.

*Aedia iridocosma*, sp. n.

♂. Head ochreous grey, collar darker grey with an ochreous reniform mark on each side darkly encircled; thorax ochreous grey, with darker grey patagia; abdomen dark grey. Primaries tawny with grey areas, median line irregular dark brown; cell grey up to this line, fold grey between this and the postmedian line; reniform ochreous grey, postmedian line crenulate, oblique, dark brown; postmedian area lilac-grey with fine deep chocolate-brown spear-head marks, each side of which is broadly edged with olive-grey; termen with dark chocolate-brown internervular spots. From the median dark line there is an elliptical olive mark darkly

encircled above the grey area on the fold, and connected with the postmedian line by a dark dash. Secondaries with basal area white, outer half blackish. Fringes white at apex and anal angle dark in lower radial area.

Expanse 34 mm.

*Hab.* Entebbe, Uganda (*Jackson*).

Type in my collection.

This possibly may be a form of *A. discistriga*, Walk., but it is so very different in general appearance that I think it must be distinct.

*Remigia alypophanes*, sp. n.

♂. Head and thorax pinkish ochreous, abdomen greyish ochreous. Primaries clear pinkish ochreous, the terminal third being darkly suffused; median line grey palely edged internally, nearly erect; postmedian line subcrenulate, produced outwards behind the lead-grey reniform; subterminal line angled sharply below the apex, decidedly curved inwards on each side of the angle; termen crenulate, deeply pointed. Secondaries straw-colour, with the terminal third blackish brown.

♀. Like the male, but the primaries are greyish, not pink.

Expanse, ♂ 38, ♀ 34 mm.

*Hab.* Senegal.

Type in my collection.

*Baniana glyphica*, sp. n.

♀. Head and thorax pale chocolate-grey, abdomen dark grey. Primaries pale chocolate, a trace of an antemedian line expanding on the fold into an irregular patch of deep brown palely edged; postmedian line fine, dark, edged with creamy, expanding at the end of the cell into a reniform large spot of deep brown palely edged; orbicular represented by a dark dot palely edged; beyond the reniform is a broad serrate stripe of olive-grey between veins 3 and 7; termen crenulate with dark internervular points. Secondaries grey, dark for the terminal third.

Expanse 40 mm.

*Hab.* Malange, Portuguese W. Africa; November.

Type in my collection.

*Baniana oxyprora*, sp. n.

♂. Head, thorax, and abdomen greyish brown, with a

proximal tuft of very dark brown. Primaries brownish grey, with a very large dark brown patch palely edged, occupying all the central part of the wing to the inner margin and sharply prowed about vein 2; termen finely dark, with a fine cream inner edging. Secondaries brownish.

Expanse 37 mm.

*Hab.* Lokoja District (100 miles north).

Type in my collection.

*Baniana eucrines*, sp. n.

♂. Head, collar, and prothorax bright chestnut-colour, thorax and abdomen ochreous grey. Primaries ochreous, with a somewhat wedge-shaped median area of dark brown, oblique on its inner margin and shortly toothed at the upper margin of the cell, the outer margin being somewhat waved and also angled as the inner margin, thus making a short top bar of a T to the mark; the orbicular shows as a very dark small spot palely edged, and the reniform is olive-brown beyond the wedge mark, a small half-ovate olive subapical costal patch; termen and fringe pale olive-brown, indefinite as to its inner boundary. Secondaries pale clear straw-yellow.

Expanse 31 mm.

*Hab.* Northern Nigeria.

Type in my collection.

*Baniana pammicta*, sp. n.

♂. Head, collar, and prothorax olive-brown, abdomen dark grey. Primaries pale lilac-grey, with the terminal area paler and less lilac; median area olive-brown, edged on each side by a pale line, the costal area down to vein 3 being produced well outwards into the postmedian area, the part near the end of the cell is paler than the rest; a small olive-brown cloud on the costa before the apex. Fringes olive-brown. Secondaries dirty grey.

Expanse 32 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet; November (*Ansorge*).

Type in my collection.

*Iluza egcarsia*, sp. n.

♂. Head, thorax, and abdomen pale coffee-brown. Both wings pale coffee-brown, with a dark, very oblique stripe running from the apex almost continuous through each wing. A small spot at the end of the cell in the primaries.

Expanse 37 mm.
*Hab.* Gunnal, Portuguese W. Africa ; November.
Type in my collection.

*Labanda malachitis*, sp. n.

♂. Head and thorax greenish, with golden-yellow bars on the frons. Primaries dark sage-green, with a dark grey basal patch on the inner margin, terminated by the interrupted antemedian black line ; median line finely black, interrupted, and angled, beyond which the ground is strongly suffused with grey ; postmedian line finely black, irregular, deeply and continuously dentate, edged externally by a pale green line ; subterminal line irregular, highly dentate, pale green, some dentations extending into the termen ; cell closed by a whitish spot, pupilled with black, and having a small black spot above it ; fringes with black spots. Secondaries dark sooty grey.
Expanse 40 mm.
*Hab.* Uganda ; August (*Jackson*).
Type in my collection.

*Antarchæa rhodopa*, sp. n.

♀. Head and collar pinkish grey, thorax pink. Primaries with the costa finely pink, upper portion of the wing dull ochreous, including all the cell, at the end of which it gradually tapers off to the apex, all the rest of the wing pink ; termen finely ochreous, invading the pink to about vein 3 ; fringes pink. Secondaries cream-colour, with a greyish area between the cell and the apex.
Expanse 29 mm.
*Hab.* Elburgon Railway Station (Uganda Railway) ; July.
Type in my collection.

Rivulana, gen. nov.

Palpi upturned, shortly scaled, and with short hairs on the upperside, second segment reaching above the vertex, end segment minute ; patagiæ very long and crest-like ; antennæ fasciculate. Fore legs deeply fringed with hair to the tarsus. Wings with costa hollowed at first, then produced upwards in a strong arch, slightly depressed at apex, which is subacute on the termen but produced forward at the tornus. Neuration : primaries with vein 2 from near middle of cell, 4 from the angle, 5 from just above the angle, 6 from below the angle ; 7, 8, and 9 stalked ; 8 and 9 on a very long stalk

quite close to the apex; 10 and 11 from the cell, the former arched upwards towards 11 at the base. Secondaries with 3 and 4 shortly stalked, 5 from just above the angle, 6 and 7 stalked, 8 shortly anastomosing at the base with the cell.

Type, *Rivulana ochrea*, B-B.

*Rivulana ochrea*, sp. n.

♂. Head, thorax, abdomen, and primaries uniformly creamy ochreous. Primaries with the reniform stigma dark and a small blackish dash on the costa directly in front of the apex; termen with black points. Secondaries pale greyish brown.

Expanse 25 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet; October (*Ansorge*).

Type in my collection.

*Auchenisa callipona*, sp. n.

♂. Head and frons whitish; collar whitish mixed with green, with a horizontal bar of blackish; palpi and proximal part of pectus black, rest of pectus pure white; thorax whitish, with a slight mixture of green; two black spots on the prothorax (one on each side); abdomen blackish grey, with whitish segmental divisions. Primaries white, largely covered with sage-green scales; a small basal black spot; antemedian line black, interrupted; median line black, strongly dentate, and edged externally with pure white; area between these two lines green; postmedian line black, crenulate, and dentate, edged more or less on each side with white; reniform black, edged laterally with white, having a black spot above it; this line is followed by a broad band of green, leaving the terminal area very broadly pure white; in this area are two black spots, one below vein 2 and one on vein 5; fringes white, with prominent internervular black spots. Secondaries pure white, with fringes spotted as the primaries and some black scales on the abdominal fold.

♀. Like the male, with the addition in the secondaries that there is a postmedian grey line beyond which the area is more or less grey, decidedly grey at the apex.

Expanse, ♂ 58, ♀ 66 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet; November (*Ansorge*).

Types in my collection.

Allied to *A. schausi*, Holl., but the median area is not black and the shape of the lines differs also.

TRISULANA, gen. nov.

Palpi thinly scaled, short, porrect, not reaching to half the frons; proboscis developed; antennæ broadly bipectinate for two-thirds in male, fasciculate in female; legs moderately hairy. Eyes smooth; thorax smoothly hairy; abdomen with a proximal tuft. Wings: primaries long, narrow. Secondaries small, subovate. Neuration: primaries as in *Auchenisa*; secondaries with veins 3 and 4 from the angle, 5 from well above the angle, 6 and 7 stalked, 8 anastomosing with the cell quite shortly.

Type, *Trisulana senex*, B-B.

*Trisulana senex*, sp. n.

♂ ♀. Head and thorax greyish, abdomen yellowish grey. Primaries yellowish grey, with a Λ-shaped black mark before the middle of the inner margin, from the apex of which ascends the blackish median line; reniform outlined in black, beyond which to the postmedian line the ground is much suffused with dark grey scales; postmedian line blackish, very irregular and dentate; termen spotted with black. Secondaries whitish at the base, grey in the outer area.

Expanse 46 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet; August and January (*Ansorge*).

Type in my collection.

AMBLYPRORA, gen. nov.

Palpi upturned, scaled, second segment reaching nearly to the vertex, end segment long; antennæ almost simple, the cilia being most minute; head scaled, with long hairs between the eyes, bent forwards; thorax densely hairy, hairs long but not tufted; abdomen with dorsal tufts on the five proximal segments. Legs densely haired, tarsi with long spines. Wings: primaries very broad, costa slightly excised, apex rounded and very slightly depressed, termen boldly excurved: secondaries fairly ample, with termen well excurved. Neuration: primaries similar to that of *Auchenisa*, Holl.; secondaries with veins 3 and 4 from the angle, 5 from well above the angle, 6 and 7 from the upper angle, 8 anastomosing very shortly with the cell.

Type, *Amblyprora acholi*, B-B.

I described this species under the name *Catephia acholi* (Ann. & Mag. Nat. Hist. ser. 7, vol. xviii. p. 344, 1906).

It is not, however, a *Catephia*, and it becomes necessary to make a genus for it.

OSTACRONYCTA, gen. nov.

Palpi smoothly scaled, upturned, second segment reaching halfway up the frons, third segment long; antennæ in female simple, vertex slightly crested; metathorax with a central tuft; proboscis fully developed. Legs: fore with long fringes of hair; mid femora fringed with long hair, tibiæ scaled with short hairs; hind femora fringed with long hair, tibiæ with a brush-like pencil of hairs from the middle to the tarsal joint. Neuration: primaries with vein 3 from before, 4 from the angle, 5 from well above the angle, 6 from the upper angle; 7, 8, 9, and 10 stalked, 8 being given off from 9 close to the apex, which has a bar from 10 to form the areole; 11 from the cell; veins 7 to 11 are closely appressed together under the costa. Secondaries with cell quite short, with 3 and 4 from the angle, 2 and 5 from close to the angle, 6 and 7 from the angle, 8 bent down to the cell and anastomosing very shortly.

Type, *Ostacronycta glaucopasta*, B-B.

*Ostacronycta glaucopasta*, sp. n.

♀. Palpi with the base of the second and third segments black, tips white; frons white; vertex pale greenish; collar glaucous; thorax pale greenish, with a few brown scales. Primaries grey, with pale green patches and black lines, giving a pleasing glaucous appearance, the grey scales being superimposed over the green; base pale greenish, with blackish dots; antemedian area dark grey, edged externally by a blackish line twice angled sharply; median area greenish, postmedian area grey, in the middle of which is the fine, very irregular, acutely angled, and serrate black postmedian line; a pale green costal patch extends through this; terminal area greenish, with termen finely black, very deeply and definitely crenulate; a longish black dash just above the tornus from the termen to the postmedian line. Secondaries pure white, with the termen narrowly grey, which colour extends finely along the veins for a short distance.

Expanse 42 mm.

*Hab.* Nairobi (*Jackson*).

Type in my collection.

*Acantholipes tandoana*, sp. n.

♂. Head and thorax dove-grey, abdomen paler. Both

wings dove-grey. Primaries very finely and sparsely irrorated with darker grey fine scales ; a small dark chocolate-brown dash closes the cell, beyond which is the darkly irrorated grey postmedian line ; subterminal line scalloped, with dark points and a tawny outer edging; termen with dark internervular points. Secondaries with traces of two median transverse grey lines, the postmedian line being more distinct ; termen with dark internervular points.

Expanse 26 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet; November (*Ansorge*).

Type in my collection.

*Parathermes acutissima*, sp. n.

♂. Head, thorax, and abdomen ashy grey. Both wings brown ash-grey. Primaries with a very oblique fine line running from a third from the base of the inner margin round the cell and back to about the middle of the costa ; beyond this is the tawny oblique postmedian line, also receding basewards just below the costa ; neither of the lines form an angle, only a deep curve ; a trace of an irregular subterminal grey line, followed by a series of dark points. Secondaries with an oblique tawny antemedian line, a curved median line, and a series of dark subterminal points.

Expanse 34 mm.

*Hab.* Malange, Portuguese W. Africa ; November.

Type in my collection.

*Deltoidinæ.*

Parasiopsis, gen. nov.

Palpi upturned, heavily scaled, with second segment not reaching up to the vertex, third segment short ; antennæ fasciculate, with a single fine cilium at each segment. Head with collar produced forward into a large prominent crest. Legs densely hairy, mid pair with a short tibial brush, hind with a long heavy tibial brush. Wings : primaries of moderate width, costa straight, slightly depressed at apex, termen evenly rounded. Neuration : primaries with vein 3 from well before the angle, 4 and 5 from the angle, 6 from below the upper angle ; 7, 8, and 9 stalked ; 10 and 11 from the cell. Secondaries with 3 and 4 stalked, 5 from below the middle of the cell, 6 and 7 very shortly stalked, 8 anastomosing with the cell for a third.

Type, *Parasiopsis arcuata*, B-B.

*Parasiopsis arcuata*, sp. n.

♂. Head, thorax, and abdomen brown. Primaries brown, tinged with chocolate-colour; a small dark spot at the end of the cell, palely edged; subterminal line pale, irregular, deeply incurved towards the cell, then rapidly advancing, and terminating in a dark spot in the tornus; termen palely dotted. Secondaries brownish grey.

Expanse 32 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet; October (*Ansorge*).

Type in my collection.

*Nodaria melanopa*, sp. n.

♂. Antennæ, head, and thorax dark brown; abdomen greyish brown. Primaries blackish brown, with the cell and beyond it darker than the rest of the wing; orbicular and reniform just visible as darker spots; a series of very fine white points well before the termen; termen darkly pointed. Secondaries greyish brown.

Expanse 26 mm.

*Hab.* Malange, Portuguese W. Africa.

Type in my collection.

*Nodaria parallela*, sp. n.

♂. Head, thorax, and abdomen pale brown. Both wings pale brown. Primaries with the fine dark brown median line finely edged with cream-colour and parallel with an exactly similar postmedian line, both being slightly curved. Termen finely cream-colour, with a fine darker internal edging. Secondaries paler at the base than the outer portion of the wing.

Expanse 20 mm.

*Hab.* Malange, Portuguese W. Africa.

Type in my collection.

*Nagadeba treicegcroma*, sp. n.

♀. Head, thorax, and abdomen tawny ochreous. Both wings tawny ochreous with darker lines. Primaries with an antemedian irregular line, followed by an irregular median line excurved round the end of the cell; postmedian line equally irregular, almost crenulate and dentate, beyond which the ground-colour is grey; a subterminal series of very dark dots in a tawny band; termen finely dark, the

orbicular and reniform stigmata are represented by one and two diaphanous spots respectively. Secondaries with a similar series of markings omitting the antemedian line, a diaphanous spot in the cell.

Expanse 30 mm.

*Hab.* Nairobi (*Jackson*).

Type in my collection.

*Sarmatia albolineata*, sp. n.

♀. Head, thorax, and abdomen dull brown. Primaries dull brown with a dark dot at the end of the cell; postmedian line white, erect, narrow, followed by a broader line of creamy brown, following which the ground-colour is darker to the deeply angled (twice) subterminal line, which has two white points just below the costa; a broad internervular short terminal dash between veins 3 and 4. Secondaries uniform greyish brown.

Expanse 34 mm.

*Hab.* N'Dalla Tando, Angola; January (*Ansorge*).

Type in my collection.

*Catada n'dalla*, sp. n.

♂. Palpi brown mixed with white scales. Head, thorax, and abdomen darkish brown. Primaries brown, slightly chocolate in tone up to the postmedian line, which is only marked by a small curved white dash below the costa and by the ground-colour being slightly paler beyond it. The whole of the wing has a rough irrorated appearance. Secondaries uniform dark greyish brown.

♀. With the postmedian line sharply defined white, before which the ground-colour is dark chocolate-brown, and after which it is ochreous brown darkly irrorated.

Expanse, ♂ 24, ♀ 27 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet; November, December (*Ansorge*).

Types in my collection.

*Catada icelomorpha*, sp. n.

♂. Palpi, head, thorax, and abdomen brown. Primaries with base dark brown, edged by a darker brown irregular line, median area pinkish brown darkening near the postmedian line which is dark and oblique, the median area is slightly ornamented with very fine short darker vertical dashes; postmedian and terminal areas quite dark with a

slight admixture of ochreous scales. Secondaries greyish brown.

Expanse 24 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet; November (*Ansorge*).

Type in my collection.

*Herminia zammodia*, sp. n.

♂. Head and thorax ochreous, abdomen greyish. Both wings ochreous with grey irroration and markings, the grey scales covering largely both wings. Primaries with only one line, viz., the postmedian, which is fine, grey, crenulate, and produced outwards in the radial area; termen with black dots. Secondaries with only one line, viz., the postmedian, which is like the same line in the primaries; termen with fine black internervular dashes.

♀. Like the male but paler, and the grey irroration much finer.

Expanse, ♂ 28, ♀ 31 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet; November and December (*Ansorge*).

Types in my collection.

*Rhynchina paliscia*, sp. n.

♂. Palpi, head, thorax, and abdomen dirty brown, both wings sooty brown with a trace of an antemedian dark line, and somewhat more of a trace of a pale angled postmedian line. Termen with internervular dark dashes.

Expanse 27 mm.

*Hab.* Lokoja District (100 miles north).

Type in my collection.

*Hypena reticulata*, sp. n.

♂. Head, thorax, and abdomen dark brown. Both wings dark brown; primaries very finely reticulated all over with darker brown; cell with two blackish points. Secondaries sooty brown.

Expanse 36 mm.

*Hab.* Kilimanjaro; February. Nairobi; April (*Jackson*).

Type in my collection.

*Deinypena triangularis*, sp. n.

♂. Head and thorax dark brown. Primaries dark chocolate-brown, with a short subbasal black lunule on the

fold ; postmedian line dark, shortly oblique on the costa and inner margin, waved, but nearly erect between these two points, greyer beyond this line, a subtriangular irregular very dark chocolate patch on the costa in front of the apex, opposite which the termen is darkly clouded ; termen palely edged with an outer margin of very dark internervular dashes. Secondaries dark brown with a trace of a short postmedian line ; termen finely pale with internervular dark dashes.

Expanse 40 mm.

*Hab.* Lokoja District (100 miles north).

Type in my collection.

*Heterogramma stenoptera*, sp. n.

♂. Head, thorax, and abdomen greyish brown. Primaries brownish grey, with an antemedian angled dark line, postmedian line dark angled once at the cell (as the previous line) with a dark point at the angle, a trace of a series of dark subterminal points ; termen with fine dark internervular dashes. Secondaries brownish grey.

Expanse 20 mm.

*Hab.* Malange, Portuguese W. Africa.

Type in my collection.

*Naarda unipunctata*, sp. n.

♂. Head, thorax, and both wings sooty black, with a small deep cream spot at reniform stigma followed by a darker wavy line.

Expanse 14 mm.

*Hab.* Lokoja District (100 miles north).

Type in my collection.

*Dichromia isosocles*, sp. n.

♂. Head, thorax, and abdomen brown. Primaries dark brown for the basal third, beyond which is a broad deep cream isosceles triangle with the outer margin continuous into the apex, this mark occupies most of the outer area of the wing, the whole space being filled in with cream-colour, except a small dark triangle below the costa ; there is also a very dark costal subapical triangle ; termen broadly brown, with a white spot below the apex adjoining the cream stripe running into the apex. Secondaries dark grey-brown, with a short tawny creamy dash from the anal angle.

Expanse 32 mm.
*Hab.* Malange, Portuguese W. Africa.
Type in my collection.

### Thyrididæ.

*Dysodia hyalotypa*, sp. n.

♂. Primaries ochreous grey, mixed with red on the fold, beyond the cell a fiery-red square spot divided into four small squares by grey lines; below this on the fold an obscure ochreous patch. Secondaries with base metallic crimson, mixed with fine dark cross-lines; a dark brown patch at anal angle, above which is a large central almost reniform hyaline patch, darkly edged all round, followed by several ochreous spots, the lowest being large, the two above it smaller; termen broadly dark reddish brown.
Expanse 20 mm.
*Hab.* Gunnal, Portuguese W. Africa; December.
Type in my collection.

*Iridesmiodes cymœasticha*, sp. n.

♂. Head reddish, thorax and abdomen pearly white. Both wings pearly white, with a series of about seven fine lilac-grey wavy lines right across each wing. Primaries with the costa reddish for the basal three-quarters.
Expanse 30 mm.
*Hab.* Lokoja District (100 miles north).
Type in my collection.
Near *ansorgei*, Warren.

*Iridesmiodes phricosticha*, sp. n.

♀. Head and collar reddish, thorax and abdomen pearly white. Both wings translucent pearly white, with a series of wavy greyish-ochreous lines. Primaries with the postmedian line accentuated, the orbicular rather marked; the subterminal line accentuated, double, and filled in with bright pink in both wings, these are followed by a marked dark series of internervular dashes, beginning in the primaries in two subapical dots. Costa of primaries reddish.
Expanse 32 mm.
*Hab.* Lokoja District (100 miles north).
Type in my collection.

*Rhodoneura palairanta*, sp. n.

♂. Head and thorax tawny red. Both wings creamy whitish, entirely sprinkled all over with lines and minute reticulations of bright tawny red. Primaries with reticulations so close that the ground-colour is only visible slightly in the median area; the postmedial oblique line is the only prominent one. Costa and termen dark red. Secondaries with the reticulations less numerous, making the ground-colour more visible.

Expanse 30 mm.

*Hab.* Lokoja District (100 miles north).

Type in my collection.

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## LXII.—*Descriptions of new Species of Lepidoptera from New Guinea.* By G. T. Bethune-Baker, F.L.S., F.Z.S.

My measurements, as usual, have been taken by doubling the distance from the centre of the thorax to the apex of the wing.

### Rhopalocera.

#### *Lycæninæ.*

*Nacaduba metriodes*, sp. n.

♂. Both wings dull violet-blue with fine dark termen, on the secondaries expanding at the anal angle by the tail rather broadly. Underside: both wings dirty grey, with spots and bars palely edged. Primaries with an antemedian bar in the cell and extending just below it, a similar one closing the cell extending to the costa, a waved series of six postmedian confluent spots, a terminal series of lunules. Secondaries with a series of three basal spots, each extending slightly beyond (outwards) the other; a bar closing the cell, with one above it shifted inwards; a curved series of eight postmedian confluent spots, the second spot shifted right out, third and fourth confluent slightly out, fifth, sixth, and seventh each slightly inwards, eighth right inwards; a series of terminal lunules, that at the tail being black edged with red above.

Expanse 28 mm.

*Hab.* Dinawa, B. New Guinea, 4000 feet; May and June (*Pratt*).

Type in my collection.

### Agaristidæ.

*Heterusia subnigra*, sp. n.

♂. Head, thorax, and abdomen deep sooty black. Both wings deep sooty black. Primaries with a broad oblique postmedian stripe across the end of the cell. Secondaries uniform black.

Expanse 38 mm.

*Hab.* Arfak Mountains, Dutch New Guinea.

Type in Coll. Kenrick.

### Noctuidæ.

#### *Stictopterinæ.*

*Gyrtona mediolineata*, sp. n.

♂. Head and thorax rufous-brown, abdomen darker brown. Primaries purplish brown, with a broad, pale, narrow, indefinite stripe from base through the cell to the termen; below this is a broad, straight, dark dash; a trace of a postmedian dark irregular spotted line; termen darkly dotted. Secondaries uniform grey-brown, becoming hyaline at the base.

Expanse 24 mm.

*Hab.* Arfak Mountains, Dutch New Guinea.

Type in Coll. Kenrick.

#### *Deltoidinæ.*

*Hypena arfaki*, sp. n.

♂. Head and thorax dark grey, with whitish scales; abdomen grey. Primaries olive-grey, closely irrorated with fine whitish scales; an irregular, serrate, excurved antemedian pale line, edged externally with olive-grey; postmedian line irregular, waved, white, edged internally with olive-grey and externally broadly with whitish scales, beyond which is a broad, irregular, dentate band of olive-grey; terminal area greyer, with a dark dash about vein 6, above which are two blackish dots edged externally with white; termen with internervular dashes, some with pale internal edging. Secondaries greyish brown.

Expanse 34 mm.
*Hab.* Ninay Valley, Dutch New Guinea, 3600 feet (*Pratt*).
Type in my collection.

**Geometridæ.**

*Boarmianæ.*

*Abraxas arfaki*, sp. n.

♀. Head, thorax, and abdomen slate-grey, the latter with orange segmental divisions. Both wings slate-grey. Primaries with a small white spot in the cell and a large irregular one at end of cell; three small white subapical spots in a curve, two white rectangular spots above the tornus, a very broad white dash in the middle of the inner margin up to vein 2. Secondaries with the median area very broadly white and a subterminal row of white rectangular spots.
Expanse 53 mm.
*Hab.* Arfak Mountains, Dutch New Guinea (*Pratt*).
Type in Coll. Kenrick.
Near *A. albiquadrata*, Warren.

**Tineidæ.**

*Daulia treicleiota*, sp. n.

♂. Head, thorax, and abdomen dark brown, patagia creamy. Primaries pale greyish brown, with three broad bars across the wings slightly darker in colour, edged laterally with dark brown, the postmedian bar being D-shaped, the terminal one erect and rather narrower than the other two. Secondaries pale brownish grey.
Expanse 34 mm.
*Hab.* Dinawa, B. New Guinea, 4000 feet; September (*Pratt*).
Type in my collection.

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## LXIII.—*On a new Black-tailed Rat from South Africa.*

By Guy Dollman.

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*Epimys nigricauda kalaharicus*, subsp. n.

Related to *Epimys nigricauda*, Thos., but smaller in size and much paler in colour.

Size of body and hind foot markedly smaller than in *nigricauda*; tail rather shorter. General colour of dorsal surface pale grey, faintly tinged with yellowish down the middle of the back. Flanks pale greyish white with no buff-coloured suffusion. Hairs of back pale slate-grey with yellowish-grey tips; interspersed are a number of rather long dark brownish hairs, but much less evident than in *nigricauda*. Face and head pale grey, rather darker on the posterior part of head. Ocular rings dark brownish black, the general effect a good deal less marked than in *nigricauda* and with no suggestion of the dark markings spreading on to the nose. Ears clothed with yellowish-buff hairs. Backs of hands and feet white. Entire underparts white, ventral surface rather less sharply marked off from the flanks than in *nigricauda*; hairs of belly white throughout. Tail similar in colour, but hairs considerably shorter, especially on the apical portion of the tail.

Skull much smaller than that of *nigricauda*, with shorter nasals and palatal foramina. Zygomatic breadth a great deal less. Molar teeth rather smaller. Unfortunately the only adult skulls of *nigricauda* in the Museum collection are imperfect, and it is at present impossible to compare the cranial regions of the two forms.

Dimensions of the type (measured in the flesh) :—

Head and body 135 mm.; tail 161; hind foot 25; ear 24·5.

Skull: greatest length 33·2; basilar length 27; condylo-incisive length 31·5; zygomatic breadth 17; interorbital constriction 4·3; squamosal breadth of cranium 15; length of nasals 12·2; palatilar length 14·1; length of palatal foramina 7·4; length of upper molar series 5·7.

*Hab.* Molopo River, South Africa. Altitude 3000 feet.

*Type.* Adult female. B.M. no. 10. 6. 3. 34. Original number 11. Collected on April 25th, 1909, by Mr. R. B. Woosnam and presented to the British Museum by the Subscribers to the Lake Ngami Expedition.

While working out the mammals collected by Mr. Woosnam during the Ngami Expedition, I provisionally identified the type of this new form as *E. nigricauda*, the type skull of *nigricauda* being too broken to be of any use for comparative purposes. Since then, however, some further specimens of *nigricauda*, collected by Dr. Ansorge in Mossamedes, have been acquired by the Museum, and it is at once evident, on comparing the skull of the Molopo specimen with an adult skull of *nigricauda*, that the two forms are quite distinct. The skins of the series from Mossamedes are

so like that of the typical *nigricauda* both in general colour and dimensions that there can be little doubt that they represent the same species. The following dimensions are those of an adult male *nigricauda* collected by Dr. Ansorge at Bombomé, Mossamedes, Angola :—

Dimensions (measured in the flesh) :—

Head and body 160 mm.; tail 191; hind foot 31; ear 22.

Skull (broken) : zygomatic breadth 19 ; length of nasals 15·2 ; palatilar length 17·6 ; length of palatal foramina 8·7 ; alveolar length of upper molar series 6.

The much smaller size and paler colour at once distinguish the Molopo race from true *nigricauda*.

The following is Mr. Woosnam's note on the habits of this rat :—

"These mice frequent the Kameel-thorn forests all over the Kalahari, especially where the trees are large, and they seem more numerous in the neighbourhood of water. They breed and spend all the daytime in the trees, only coming down on to the ground at night to feed. They generally choose an old hollow tree, into which a great quantity of dry grass is packed, sometimes as much as 20 feet from the ground. By setting fire to the nest they are easily smoked out, but not so easily caught, as they are very expert climbers and jump from the ends of a bough into a bush and so to the ground and escape in the grass."

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## LXIV.—*An Epizoic Hydroid on a Crab from Christmas Island.* By W. T. Calman, D.Sc.

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Among the Crustacea obtained by Mr. R. Kirkpatrick on a recent visit to Christmas Island (Indian Ocean) is a small crab belonging to the family Xanthidæ, which attracted notice by having a hydroid polyp attached, like a tassel, at the "knee" of each of its legs.

While it is very common to find hydroids attached to spider-crabs of the group Oxyrhyncha, it is much more rare in the case of crabs belonging to other divisions of the Brachyura. Further, in the Oxyrhyncha the association is more or less accidental, the hydroids being no more closely or constantly connected with the crab than any of the other

organisms, plant or animal, which it plucks from its surroundings to "mask" its shell. The present case seems to deserve record on account of two circumstances, which suggest that the association is here of a more intimate and constant character: the first is the symmetrical way in which the hydroid colony is disposed with regard to the crab; the second is the fact that the type specimens of the species to which the crab belongs, although coming from a distant locality, are found on re-examination to carry colonies of a closely similar, perhaps identical, species of hydroid.

The crab belongs to the species described by Miers * from the 'Challenger' collections as *Medæus haswelli*. It is a female, about 6·7 mm. in width across the carapace, and was dredged at a depth of 45 fathoms off Flying Fish Cove, Christmas Island. On comparing it with the three imperfect type specimens from Twofold Bay, New South Wales (150 fathoms), the only difference that can be detected is that the teeth of the antero-lateral margins, as well as the granules on the surface of the body and chelipeds, are rather less prominent and acute in the specimen from Christmas Island. It is to be noted, however, that Miers's figure is not quite accurate as regards the outline of the carapace, the distance from the outer angle of the orbit to the first antero-lateral tooth being considerably exaggerated.

I cannot find that Miers's species has been recorded or discussed by any author since its description. So far as can be judged from the material examined, its affinity with the genus *Medæus* is by no means clear. The characteristic prolongation of the antero-lateral margin below the orbit is represented, as Miers says, "merely by a very obscure line of granules," and it is hard to find any other character which might justify the assignment of the species to *Medæus*. On the other hand, the proportions of the front and of the fronto-orbital border suggest that the species should be referred to the subfamily Chlorodiinæ of Alcock's classification †, and it does not seem to differ in any important character from some of the species included in the genus *Xanthias* (=*Xanthodes*) in that subfamily. I propose, therefore, to refer to it as *Xanthias haswelli*.

The hydroid is a gymnoblastic species, of which, in the absence of gonophores, the systematic position cannot be exactly determined. It has a creeping hydrorhiza, about ·07 mm. in width, closely adherent to the surface of the crab,

* Rep. Brachyura 'Challenger,' p. 117, pl. xi. fig. 2 (1886).
† Journ. Asiatic Soc. Bengal, lxvii. pt. ii. p. 78 (1898).

and invested by a delicate membranous perisarc. There is no hydrocaulus, the polyps springing directly from the hydrorhiza, the perisarc of which can with difficulty be seen to be continued upwards for a very short distance at the base of each. The largest polyps are about ·5 mm. in height in the preserved state, obconical in shape, expanding from a narrow base to about ·2 mm. in diameter at the distal end. The tentacles are 10–12 in number, set in a single whorl, surrounding a low convex hypostome. The branches of the hydrorhiza are largely isolated, anastomosing here and there, and only in one or two places showing a tendency to form a closer network.

In the characters of the hydrorhiza and of the sterile polyps the species appears to approach most nearly to the genus *Stylactis*, Allman, which already includes several species of similar epizoic habits, e. g., *S. vermicola*, Allman *, and *S. minoi*, Alcock † (the latter more recently transferred to *Podocoryne* by Stechow ‡). From these and all the other species hitherto referred to the genus the form now described differs in the number of tentacles and in the low rounded form of the hypostome. In view of the uncertainty as to its generic position, however, it appears premature to distinguish it by a specific name.

The disposition of the hydroid colony on the surface of the crab deserves further description. On the dorsal surface of the carapace no polyps are developed, but the hydrorhiza follows closely the inter-regional grooves, so that, when viewed with the naked eye or with a lens of low power, most of the regions appear to be sharply defined by a narrow line. The arrangement is not absolutely symmetrical, but it is possible that in one or two places the hydrorhiza may be imperfectly preserved. Each of the legs carries a single trunk of hydrorhiza which runs along the merus just behind its upper edge, apparently following, in the case of the walking-legs, an ill-defined groove between the marginal row of spiniform tubercles and a second row on the posterior face of the segment. On the chelipeds this trunk spreads out in an irregular fashion on the carpus, tending to form a network of which the meshes are occupied by the granules of the carpus; the carpus bears two polyps of unequal size in approximately corresponding positions on each of the chelipeds; the hydrorhiza is continued along the upper edge of

* Rep. Hydroida 'Challenger,' pt. ii. p. 2, pl. i. figs. 2, 2 *a* (1888).

† Ann. & Mag. Nat. Hist. (6) x. p. 207, fig. (1892).

‡ Zool. Anz. xxxii. p. 752 (1908); Abh. math.-phys. Kl. k. Bayer. Akad. Wiss. i. Suppl. Bd., Abh. 6, p. 17, pl. iv. fig. 8 (1909).

the hand, where it bears a single polyp. On the walking-legs the main trunk of the hydrorhiza, on reaching the joint between the merus and carpus, divides into two branches which cross the joint at the condyle on each side, where the extent of movement is least, and reunite to run along the upper edge of the carpus and propodus. On each leg, at the point of reunion of the branches, near the proximal end of the carpus, a polyp is attached.

All the polyps mentioned, namely, two on the carpus and one on the propodus of the cheliped and one on the carpus of each walking-leg, are symmetrically developed on both sides of the crab. Only two small polyps are unsymmetrically situated, one on the upper edge of the merus of the right cheliped and one at the distal end of the merus of the penultimate leg on the left side.

Fig. 1.

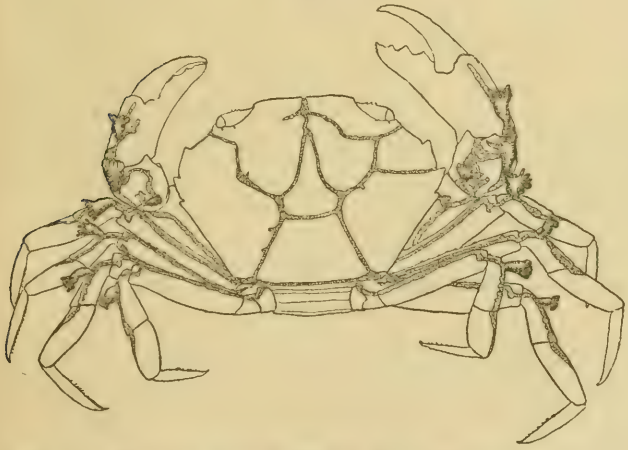


Fig. 2.



Fig. 1.—*Xanthias haswelli* (Miers) from Christmas Island, carrying an epizoic hydroid (*Stylactis* (?) sp.). × 5.

Fig. 2.—*Stylactis* (?) sp., one of the polyps further enlarged. The form of the hypostome is indicated by a dotted line.

As already mentioned, the three type specimens of *Xanthias haswelli* show the remains of similar hydroid colonies. The hydrorhiza outlines the areas of the carapace much as in the Christmas Island specimen, and no doubt accounts for Miers's remark, "the sutures defining the various regions of the dorsal surface very distinct." The polyps are very badly preserved, having apparently suffered drying, and it is not possible to state whether they agree in structure with those

of the Christmas Island specimen ; in one point they certainly differ, for all the polyps observed are on the dorsal surface of the carapace, mostly between or near the antero-lateral teeth. The few remaining limbs show portions of hydrorhiza in the same positions as described above, but no polyps.

In addition to the hydroid the Christmas Island specimen of the crab carried a number of individuals of a very minute solitary entoproctous Bryozoan probably belonging to the genus *Loxosoma*. Many of these were attached to or in the near neighbourhood of the hydrorhiza, but they showed no tendency to a symmetrical arrangement on the two sides of the crab.

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*Atlas of Zoogeography.* Prepared by J. G. Bartholomew, LL.D., F.R.S.E., W. Eagle Clarke, F.R.S.E., F.L.S., and Percy H. Grimshaw, F.R.S.E., F.E.S. Bartholomew & Co.: Edinburgh Geographical Institute, 1911.

"The object," we are told, "of the present volume is to delineate and describe, so far as the state of our knowledge permits, the present distribution of the higher animals over the surface of the Earth. This undertaking . . . . . is entirely the result of original researches into the zoological literature of all countries. All the families of Mammals, Birds, Reptiles, and Amphibians, together with several of the more important genera and species, have been dealt with, while the work embraces in addition most of the families of Fishes and a selection of families and genera of Molluscs and Insects."

The authors in undertaking this work set themselves a formidable task, which they have achieved with conspicuous success, providing a work of reference which will be of the highest value both as a repository of our knowledge to-day and as a basis for further research.

In the case of a work which gives evidence of so much study and care in the preparation it seems ungracious to suggest that it is in any sense defective. Yet we cannot help regretting the omission of the late Dr. Bowdler Sharpe's map of the zoogeographical regions, for he was an authority of great weight on this subject, and his map founded on the distribution of birds contained much valuable and suggestive material. Happily the maps of Russel Wallace, Sclater, Heilprin, and Lydekker are given, and the marine areas of Ortmann and Sclater respectively.

The text has been condensed within an amazingly small compass (we cannot help thinking unnecessarily so), and we hope that if a further edition is called for this will be remedied. Another dozen pages or so would surely not add greatly to the cost of a book already expensive, and it would materially increase its usefulness.

*U.S. Department of Agriculture: Bureau of Biological Survey. North American Fauna*, No. 31 (Oct. 19, 1910). *Revision of the Wood Rats of the Genus* Neotoma. By Edward A. Goldman, Field Naturalist, Biological Survey. Prepared under the direction of Henry W. Henshaw, Chief of Bureau of Biological Survey. Washington. Pp. 107; pls. 8 and 14 illustrations in the text.

The present monograph includes 70 species, divided into 3 subgenera—*Neotoma*, *Homodontomys*, and *Teonoma*; a few forms are here described as new. These rats are confined to North and Central America, and are most numerous in the west and south; in the Hudson Bay Region and the upper part of the Mississippi Valley they are absent. An interesting account is given of their habits, and they are sometimes destructive to crops, and especially to stored grain, as well as to various shrubs; in Mexico some species are used for food by the inhabitants. In California it has lately been discovered that they are liable to become infected with plague.

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## PROCEEDINGS OF LEARNED SOCIETIES.

### GEOLOGICAL SOCIETY.

March 22nd, 1911.—Prof. W. W. Watts, Sc.D., M.Sc., F.R.S., President, in the Chair.

The following communications were read:—

1. 'On Some Mammalian Teeth from the Wealden of Hastings.' By Arthur Smith Woodward, LL.D., F.R.S., F.L.S., Sec.G.S.

Mr. Charles Dawson, F.S.A., F.G.S., has obtained two imperfect molars, apparently of *Plagiaulax*, from beds of grit in the Wealden near Hastings; and his associates in the work of exploration, Messrs. P. Teilhard de Chardin and Félix Pelletier, have found a well-preserved multituberculate molar of the form named *Diprionodon* by Marsh. These specimens are described.

2. 'Faunal Horizons in the Bristol Coalfield.' By Herbert Bolton, F.R.S.E., F.G.S., Curator of the Bristol Natural History Museum.

The Author has been engaged for three years in the examination of the Coal Measures of the Bristol Coalfield, and has determined

the existence of faunal horizons at the collieries of South Liberty, Easton, Hanham, Speedwell Deep, and Coalpit Heath in the Bristol and Gloucestershire area, and at Ludlows, Middle Pit, Tyning, Wellsway, Writhlington, Foxcote, Dunkerton, Newbury, and Mackintosh collieries in the Radstock area. A measured section of 760 feet between the Ashton Great Vein and the Bedminster Great Vein at the South Liberty colliery, Bristol, has been examined in detail, and four faunal horizons discovered. These horizons occur at 134, 284, 286, and 637 feet respectively below the Bedminster Great Vein. In every case the fauna was marine in character, and the Author's work shows that the Ashton and Bedminster Series of Bristol, the Coalpit Heath and Parkfield Series of the northern part of the Coalfield, and the Vobster Series of Radstock are all characterized by a fauna agreeing with the typical fauna of the Lower Coal Measures of the coalfields of the Midlands, and of Lancashire and Yorkshire.

Species of *Carbonicola* are rare, while the cephalopod and fish fauna is poor. The Second or Farrington Series of the Upper Coal Measures has yielded *Lingula mytiloides*, several species of ostracods, four species of *Anthracomya*, and scales of *Strepsodus sauroides*. *Cœlacanthus elegans* has been found in the First or Upper Radstock Series. The presence of marine phases in the Bristol Coalfield is confirmatory of the evidence obtained by Mr. W. H. Dyson in the Yorkshire Coalfield, where an extensive fauna has been found in four horizons above the Barnsley Coal.

In the Bristol, as in the Yorkshire Coalfield, the marine fauna undergoes no marked change in its upward range, specific identity being retained in the uppermost horizons, while new species are rare.

Insect-wings referred to the genus *Genentomum* have been found at one horizon in the South Liberty colliery, Bristol, 637 feet below the Bedminster Great Vein; while the rare phyllopod, *Leaia leidyii*, var. *salteriana*, hitherto only known from the Lower Carboniferous of Fifeshire, was found in great abundance in the roof-shales over the High Vein of the Parkfield Series at Coalpit Heath Colliery. Frequently the specimens occurred in dense clusters, the latter being distributed over the surface of the slabs of shale. The smallest are not more than 2 millimetres in length, the largest reaching 8 mm.; hundreds of examples were found. The total number of species now recorded by the Author from the Bristol Coalfield amounts to seventy-four: they are as follows:—Echinodermata 1; Vermes 2; Brachiopoda 9; Pelecypoda 25; Gasteropoda 13; Cephalopoda 8; Arthropoda 6; and Pisces 10.

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No. 47. NOVEMBER 1911.

## LXV.—*The Classification of the Teleostean Fishes of the Order Ostariophysi.—2. Siluroidea* *. By C. Tate Regan, M.A.

(Published by permission of the Trustees of the British Museum.)

The Siluroids may be thus defined:—Ostariophysi with the body naked or covered with bony plates, the mouth non-protractile and the branchiostegal rays often numerous; parietals, symplectic, and suboperculum absent; second, third, and fourth vertebræ ankylosed to form a complex to which the fifth is rigidly attached; parapophyses ankylosed with centra; epipleurals and epineurals absent.

As in all Ostariophysi, there is no basisphenoid, but an orbitosphenoid is always present; the latter joins the frontals above, the parasphenoid below, the lateral ethmoids in front, and the alisphenoids behind. There is no opisthotic, but the other otic bones are present; the epiotics are rarely prominent, but in the Doradidæ they are important elements of the cranial roof. The præmaxillaries are typically fixed, but in the Callichthyidæ and Loricariidæ they are movably articulated with the mesethmoid; sometimes the toothed præmaxillaries extend right back to the angle of the mouth (*Wallago, Ageniosus, Asterophysus*), and the posterior extension may segment off as a distinct bone (*Eutropiichthys*),

* The Cyprinoidea have been dealt with in a separate paper, *supra*, p. 13.

simulating a toothed maxillary. In *Diplomystes* the maxillary is expanded distally and toothed, but in all other Siluroids it is toothless, serving only as the base of a barbel; in *Eutropiichthys* the small toothless maxillary bears a barbel and articulates with the anterior end of the palatine just as in the closely allied *Schilbichthys*. The palatine articulates with the lateral ethmoid and bears the maxillary; the pterygoid, when present, is small, connecting the palatine with the mesopterygoid; the metapterygoid is always well developed, suturally united with the quadrate and usually with the hyomandibular. The operculum and interoperculum are constantly present; the lower pharyngeals are toothed (except in some Loricariidæ), separate (except in *Hypophthalmus*), opposed to a single pair of dentigerous patches supported by the third and fourth pharyngobranchials, the first and second being absent.

The pectoral arch of the Siluroids is highly characteristic; the post-temporal, when present, is a small plate rigidly attached to the skull, overlying the suture between epiotic and pterotic and reaching the supraoccipital; distally it overlaps the proximal extremity of the supra-cleithrum, which is typically forked, the upper limb usually rigidly attached to pterotic and epiotic, the lower to the basioccipital; sometimes the lower limb is absent (Clariidæ, Callichthyidæ, Loricariidæ); the distal part, "stem," of the supra-cleithrum, beyond the fork, is deeply cleft to form a socket for the head of the cleithrum. The mesocoracoid is usually present, but is wanting in three families, Ariidæ, Doradidæ, and Bunocephalidæ; the hypocoracoids usually form an interlocking symphysis behind that of the cleithra, but in certain groups (Siluridæ, Trichomycteridæ) they taper forwards below and do not form a symphysis. The pectoral radials are three in number, the first short, the outer ones more or less elongate.

The centrum of the first vertebra is a disc, rigidly united and often ankylosed to the basioccipital and to the complex centrum, which is formed by the fusion of the second, third, and fourth; the first parapophysis is that of the fourth vertebra, corresponding to the *os suspensorium* of the Cyprinoids; the fifth vertebra is rigidly attached to the complex and its parapophysis also supports the air-bladder. The sixth and following vertebræ usually bear ribs attached to normal parapophyses, but the anterior (*Pseudecheneis*, *Callichthys*, Doumeinæ) or all (*Corydoras*, Loricariidæ, Bunocephalidæ) the ribs may be sessile.

The "nuchal shield," which is so characteristic of many

Siluroids, is formed by a process of the supraoccipital and by three plates which are expansions of the distal ends of the "interneurals" (basalia + radalia) of the first three rays of the dorsal fin. These bones are directed obliquely upwards and backwards, in such a way that the fin-ray articulates with the distal end of its own radial and also rests upon the upper part of the one behind it; when the second dorsal ray forms a spine it is the third interneural which becomes enlarged to support it, whilst the second bears the short anterior spine and the first is set free, sometimes expanding to form the first nuchal plate.

The air-bladder, when well developed, differs from that of the Cyprinoids in that it is divided into anterior and posterior divisions not by a constriction but by an internal partition; the posterior division is rendered non-distensible by the development of longitudinal and transverse septa, whilst the anterior gives rise to the pneumatic duct, is connected with the tripus, and usually extends laterally to beneath the skin above the pectoral fin. The parapophysis of the fourth vertebra is usually divided into an anterior branch, decurved and firmly attached distally to the stem of the supra-cleithrum, and a posterior horizontal branch; these give attachment to the anterior and dorsal walls of the anterior chamber of the air-bladder.

Modifications of the simple condition just described may be of two kinds—(1) The anterior ramus of the parapophysis of the fourth vertebra loses its attachment to the supra-cleithrum, its proximal end forms a thin laminar stem and its distal end an expanded plate, inserted in the wall of the air-bladder and furnished with a muscle attached anteriorly to the skull, the whole forming an "elastic spring mechanism." A posterior diverticulum of the air-bladder is often found in Siluroids with this arrangement, which occurs in the Doradidæ, Pangasiidæ, Synodontidæ, and Malopteruridæ.

(2) The air-bladder is reduced, the posterior part disappearing and the anterior part becoming divided into two lateral portions which may be completely disconnected; concurrently the fourth and fifth transverse processes tend to surround and encapsule the air-bladder, in the most specialized types forming complete bony cylinders, open only at their outer ends.

Günther* regarded the Siluroids as a single family, and his classification, based on external characters only,

* Cat. Fish. v. (1864).

was in most respects satisfactory. Several authors have given family names to some of Günther's groups*, and of these the Eigenmanns† have utilized differences in the structure of the vertebral column and the air-bladder in order to characterize the South-American families. Boulenger‡ separated off as two families the Siluroids with all the ribs sessile, retaining the remainder in one family, Siluridæ, divided into eight subfamilies characterized by the length of the dorsal and anal fins, the freedom or union with the isthmus of the gill-membranes, &c., the majority of these groups being unnatural.

Bridge and Haddon's§ great memoir on the Siluroid air-bladder is of considerable service in working out the classification. Comparatively little has been written on the osteology of the Siluroids, although Koschkaroff‖ has recently given a useful account, with figures, of the skeletons of several genera. The scheme here put forward is based on the examination of a large series of skeletons, and a far greater number of families is recognized and defined than in any previous system. The majority of these are much better characterized than most of the families of Percoids; the differences between the Lutianidæ and Sciænidæ, for example, are trifling compared with those between the Synodontidæ and Doradidæ, which have usually been associated in the same subfamily.

In the following account I place first the Diplomystidæ, more generalized than any of the others in the normally formed toothed maxillary and in the simple attachment of the fifth vertebra to the complex. Next the Ariidæ and Doradidæ are considered, generalized in form and in fin-structure, but aberrant in the loss of the mesocoracoid, and they are followed by the Plotosidæ and Siluridæ, which have a very long anal fin, but are primitive in some other characters, such as the many-rayed pelvic fins. Then come the Bagridæ, widely distributed in Asia and Africa, and they are followed by the North-American Amiuridæ and by a number of Old-World families which may be regarded as

* Gill (Smithson. Misc. Coll. xi. 1872) named, but defined only by references to Günther's Catalogue, the families Hypophthalmidæ, Trichomycteridæ, Siluridæ, Chacidæ, Plotosidæ, Clariidæ, Callichthyidæ, Argidæ, Loricariidæ, Sisoridæ, and Aspredinidæ.

† Occ. Papers Calif. Acad. i. (1890).

‡ Cambridge Nat. Hist. Fish. p. 586 (1904).

§ Phil. Trans. clxxxiv. (B) 1893, p. 65.

‖ Bull. Soc. Nat. Moscow, 1905, p. 209. The genera described are *Loricaria, Synodontis, Macrones* or a related genus wrongly named *Akysis, Clarias, Silurus, Arius, Eutropius, Malopterurus.*

specialized Bagrids, Amblycepidæ, Sisoridæ, Amphiliidæ, Chacidæ, Schilbeidæ, Clariidæ, Pangasiidæ, Synodontidæ, and Malopteruridæ. The neotropical Siluroids (except the Doradidæ) come last, and these begin with the Pimelodidæ, which represent the Bagridæ in South America, and are followed by the Helogenidæ, Hypophthalmidæ, Trichomycteridæ, and Bunocephalidæ, ending with the highly specialized Callichthyidæ and Loricariidæ, which are the most aberrant fishes of the order.

### Family 1. Diplomystidæ. (Fig. 2, C.)

Body naked, moderately elongate. Gill-membranes united, but free from isthmus. Dorsal fin anterior, with a spine; adipose fin present; anal short; pelvics 6-rayed; pectoral with a spine. Nostrils close together; a pair of maxillary but no other barbels; præmaxillaries fixed; maxillary well developed, toothed, expanded distally, and proximally articulated with both heads of the palatine; bands of villiform teeth in jaws, obtuse teeth on the vomer. Palatine forked anteriorly; no pterygoid; mesopterygoid very small, connecting metapterygoid with vomer; metapterygoid attached to palatine anteriorly and to orbitosphenoid internally; head of hyomandibular broad, articulating with pterotic, sphenotic, and alisphenoid. Post-temporal present; supracleithrum forked; mesocoracoid present; hypocoracoids narrowed forward below, not meeting. Vertebræ 42 (17 + 25); ribs on parapophyses; fifth vertebra rigidly attached to complex, but not forming interlocking sutures; parapophysis of fifth vertebra normal, of fourth a transverse lamina with a stout somewhat decurved anterior process firmly attached to the stem of supra-cleithrum; first centrum well developed, separating complex from basioccipital.

*Diplomystes papillosus* from Chili and Argentina.

In all the remaining Siluroids the maxillary is slender, toothless, and the fifth and complex vertebræ unite by interlocking sutures or are ankylosed or united by investing bone.

### Family 2. Ariidæ.

Naked, moderately elongate; gill-membranes united, forming a fold across isthmus. Dorsal fin anterior, with a spine; adipose fin present; anal short or of moderate length; pelvics 6-rayed; pectoral with a spine. Mouth terminal; teeth in jaws and often on palate; nostrils usually close together, without barbel; maxillary and one or two pairs of mandibulary barbels. Epiotics with posterior

laminæ which (except in *Galeichthys*) extend to and unite with the posterior rami of the parapophyses of the fourth vertebra; a pair of large thin-walled bullæ formed by prootic, pterotic, and exoccipital; a stout subconical inferior process at the junction of basioccipital and complex vertebra. Palatine rod-like; pterygoid, when present (*Ælurichthys*) very small, adherent to lower surface of posterior part of palatine; mesopterygoid small, lying between the lateral ethmoid and the large metapterygoid. Post-temporal present; supra-cleithrum with stout lower limb united by suture with basioccipital; no mesocoracoid; hypocoracoids interlocking below. Vertebræ 48 to 58 (22–29 + 27–33); ribs on well-developed parapophyses; one, two, or three rib-bearing vertebræ (sixth to eighth) rigidly united to fifth and complex by a backward extension of investing bone over their centra; parapophysis of fifth vertebra enlarged, suturally united to that of the fourth, which is an expanded lamina with a decurved anterior process rigidly attached to the limb of supra-cleithrum. Air-bladder large, free, normal.

Fishes of the shores and estuaries of tropical and subtropical regions, a few species perhaps permanently fluviatile.

Principal genera: *Arius*, *Galeichthys*, *Ancharius*, *Genidens*, *Hemipimelodus*, *Ketengus*, *Ælurichthys*, *Batrachocephalus*, *Osteogeneiosus*.

### Family 3. Doradidæ. (Fig. 3, A.)

Body moderately elongate. Gill-membranes broadly united to the isthmus. Dorsal fin anterior, with a spine; adipose fin usually present; anal short or rather long; pelvics 6- to 16-rayed. Mouth terminal; jaws usually toothed; maxillary and one or two pairs of mandibulary barbels; nostrils remote, without barbels. Palatine rod-like; pterygoid absent; mesopterygoid present, connecting metapterygoid with lateral ethmoid. A nuchal shield; epiotics prominent on the upper surface of the skull, united by suture with both nuchal plates, and giving rise posteriorly to more or less developed backwardly directed processes *. No post-temporal; supra-cleithrum suturally united with skull, the upper limb to the pterotic and epiotic, the lower to the basioccipital and exoccipital; no mesocoracoid; hypocoracoids interlocking below. Vertebræ 36 to 58 (13–17 +

* These are short pointed projections in *Doras* and *Oxydoras*, but in *Hemidoras* they extend backwards to the inferior processes of the posterior nuchal plates. In the other genera the epiotic processes are forked, the inner limbs running to the parapophyses of the sixth vertebra.

23–41); ribs on transverse processes; eighth or ninth the first free vertebra; parapophyses of fifth vestigial or absent; parapophyses of fourth undivided, proximally thin, laminar, distally forming expanded subvertical oval plates, free from the supra-cleithra, applied to the lateral walls of the anterior part of the air-bladder.

South American fresh-water fishes.

The principal genera may be arranged thus:—

I. A series of bony plates on each side; mouth rather small; pelvic fins 7-rayed; air-bladder large, free, normal or with a posterior cæcum ..... *Doras, Oxydoras, Hemidoras.*

II. Body naked; pelvic fins 6- to 16-rayed; air-bladder large, free, normal or with a posterior cæcum.

A. Mouth rather wide, not extending beyond eye; præmaxillaries fixed, transverse ..... *Centromochlus, Trachelyopterus, Trachelyopterichthys, Pseudauchenipterus, Auchenipterus* (*Euanemus*), *Trachycorystes, Epapterus, Tetranematichthys.*

B. Mouth very wide, extending far beyond eye; præmaxillaries extending to angle of mouth .... *Asterophysus.*

III. Body naked; pelvic fins 7-rayed; air-bladder very small, partly enclosed in two small spherical or pyriform capsules separated by a septum and attached to the aortic ridges, with small posterior and larger supero-lateral apertures; the reduced plates of the "spring apparatus" attached to the free wall of the air-bladder at the larger openings; mouth wide, the movable præmaxillaries extending to its angle ..... *Ageniosus.*

### Family 4. Plotosidæ.

Body naked, elongate; gill-membranes free or narrowly attached to the isthmus. Dorsal fin well developed, with a spine, placed anteriorly; no adipose fin; anal very long, confluent with the caudal, which may extend forward along the back, simulating a second dorsal fin; pelvics 10- to 16-rayed. Nostrils remote, the posterior with a barbel; on each side one or two maxillary and two mandibulary barbels. Teeth in jaws conical or obtuse; a patch of blunt molars on the vomer. Palatine rod-like; mesopterygoid rather small, attached to head of vomer and to the large metapterygoid, which is connected with the palatine external and the orbitosphenoid internal to its union with the mesopterygoid; head of hyomandibular very broad, articulating with pterotic, sphenotic, and alisphenoid. Skull depressed; sphenotics projecting laterally but not produced forwards, the frontals with free margins. Post-temporal present; lower fork of supra-cleithrum well developed, attached to basioccipital;

mesocoracoid present; hypocoracoids interlocking below. Vertebræ 46 to 81 (16–19+30–65); ribs attached to long parapophyses; anterior ramus of parapophysis of fourth vertebra decurved, rigidly attached to the stem of supracleithrum, more or less expanded, together with expanded processes of the aortic ridges supporting the anterior wall of the large free air-bladder.

Marine fishes of the Indo-Pacific, entering rivers, and with some permanently fluviatile species.

Genera: *Eumeda, Neosilurus, Copidoglanis, Plotosus, Cnidoglanis, Euristhmus.*

### Family 5. Siluridæ.

Body naked, elongate; gill-membranes free from isthmus. Dorsal fin, when present, small, without spine; no adipose fin; anal very long, many-rayed, ending close to the caudal or continuous with it; pelvics 6- to 14-rayed. Anterior and posterior nostrils wide apart; no nasal barbel; maxillary and often one or two pairs of mandibulary barbels. Teeth in jaws and often on palate. Palatine short and broad, articulating with an antero-lateral facet of the lateral ethmoid; pterygoid absent; mesopterygoid small, connecting the large metapterygoid with the vomer; hyomandibular with a broad head, articulating with pterotic and sphenotic. Lateral ethmoid with a projection for the attachment of the præorbital and with a slender posterior extension which meets a similar forward extension of the sphenotic, so that the frontal has no free edge. Post-temporal absent; upper limb of supra-cleithrum wedged between pterotic and epiotic, lower running to basioccipital; mesocoracoid present; hypocoracoids tapering forward below, not forming a symphysis. Vertebræ 52 to 74 (10–16+41–58); ribs attached to long parapophyses; sixth vertebra free; anterior and posterior rami of parapophysis of fourth vertebræ connected at the base only, the anterior stout, firmly attached to the limb of supra-cleithrum; air-bladder free, usually large.

Fresh-water fishes of Europe and Asia.

The genera may be arranged thus:—

I. Eye above the level of the mouth; hypocoracoids slender.
*Silurus, Parasilurus, Silurichthys, Wallago, Belodontichthys.*

II. Eye behind the angle of mouth; hypocoracoids expanded.
*Callichrous, Cryptopterus, Hemisilurus.*

This family has usually been united with the Schilbeidæ, but the two have very little in common beyond the elonga-

tion of the anal fin. The many-rayed pelvic fins, the contiguous or confluent anal and caudal, combined with the absence of a dorsal spine, of an adipose fin, and of nasal barbels, characterize the Siluridæ externally, whilst the osteology is quite different from that of the Schilbeidæ, with their rod-like palatine, frontals with free edges, and lateral ethmoids not projecting outwards.

### Family 6. Bagridæ.

Body naked, moderately elongate; gill-membranes separate or notched, free or at least forming a free fold across isthmus. Dorsal fin anterior, with a spine; adipose fin present; anal short or of moderate length; pelvic fins usually 6-rayed (7- or 8-rayed in *Rita*). Anterior and posterior nostrils wide apart, the latter usually with a barbel; maxillary and usually one or two pairs of mandibulary barbels. Jaws toothed; palate often toothed. Lateral ethmoid facet for articulation of palatine rarely strictly lateral, usually visible when the skull is seen from below; palatine rod-like; pterygoid present, attached to lower surface of hinder part of palatine (fig. 1, B); mesopterygoid small, anterior to the well-developed metapterygoid; hyomandibular with a broad head, fitting into a groove formed by the pterotic and sphenotic. Post-temporal present; supra-cleithrum rigidly attached to skull, with the lower limb well developed; mesocoracoid present; hypocoracoids meeting and interlocking behind the symphysis of the cleithra. Vertebræ 34 to 55 (10–23 + 20–34); ribs attached to long parapophyses; anterior ramus of parapophysis of fourth vertebra firmly attached to supra-cleithrum; air-bladder large, free, normally formed.

Fresh-water fishes of Asia and Africa.

The principal genera may be arranged thus:—

I. Pterygoid and mesopterygoid laminar, rather loosely connected; parapophysis of fourth vertebra intervening between supra-cleithrum and anterior wall of air-bladder; lower limb of supra-cleithrum normal. (*Chrysichthyinæ.*)

A. Parapophysis of fourth vertebra with a stout anterior ramus attached to the supra-cleithrum and connected at the base with the posterior ramus, which resembles a normal parapophysis.

No nasal barbel; anterior nostril labial, posterior slit-like; sixth vertebra free ..... *Parauchenoglanis, Auchenoglanis, Notoglanidium.*

A nasal barbel; sixth vertebra rigidly united with fifth ..... *Rita, Pseudobagrus, Gephyroglanis* *.

* *Leptoglanis*, without nasal barbel, may be related to *Gephyroglanis*.

B. Parapophysis of fourth vertebra a horizontal lamina, sharply bent downward in front to form a thick vertical plate attached to the stem and lower limb of supra-cleithrum; a nasal barbel.
*Clarotes, Chrysichthys*.*

II. Pterygoid and mesopterygoid united by suture or ankylosis to form a transverse crescent; parapophysis of fourth vertebra a transverse lamina with a decurved anterior process attached to the inner edge of a vertical laminar expansion of the stem and lower limb of the supra-cleithrum, which supports the anterior wall of the air-bladder; a nasal barbel. (*Bagrinæ.*)
*Bagrus, Macrones, Liocassis, Bagroides, Olyra.*

## Family 7. Amiuridæ.

Closely related to the Bagridæ, but without a pterygoid and with the pelvic fins 8- or 9-rayed; palate toothless. The vertebræ number 44 to 50 (16–19 + 28–31), the anterior vertebræ formed as in *Auchenoglanis* or *Rita*; in *Amiurus* the pectoral arch is as in the Bagridæ, but in *Noturus* the post-temporal is absent and the lower limb of the supra-cleithrum is short, only connected with the basioccipital by a ligament.

Fresh-water fishes of North America, with a species of *Amiurus* in China.

In some species of *Amiurus* the anal fin is quite long, as in the Schilbeidæ, but the skull is typically Bagrid, differing from that of the Schilbeidæ in the projecting lateral ethmoids and pterotics.

## Family 8. Amblycepidæ.

External characters of the Bagridæ, to which they bear a general resemblance in their osteology, differing in certain features of specialization. The pterygoid is absent, the metapterygoid is reduced, and the elongate mesopterygoid extends from the palatine to the hyomandibular (fig. 1, C). There is no post-temporal and the proximal end of the upper limb of the supra-cleithrum is wedged in between pterotic and epiotic. The parapophyses of the fourth vertebra form on each side a semicylinder incomplete below, or an inverted cup, partly enclosing the reduced air-bladder, which is divided into two lateral sacs. Vertebræ 36 to 45 (15–16 + 21–29).

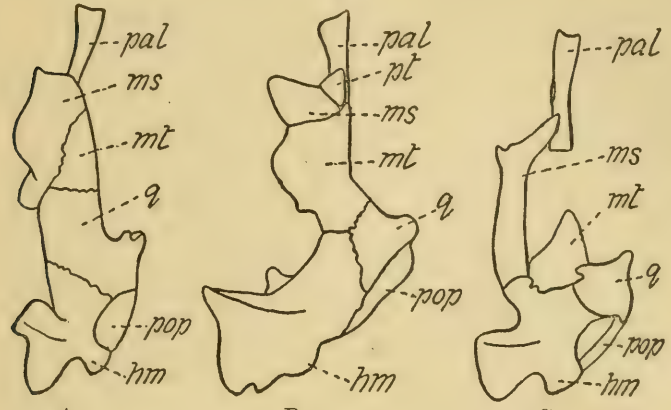
Asiatic fresh-water fishes of small size, belonging to four genera: *Amblyceps, Liobagrus, Akysis* (*Sosia*) and *Acrochordonichthys.*

I have examined skeletons of *Amblyceps* and *Liobagrus.*

* *Phyllonemus*, without nasal barbel, may be related to *Chrysichthys.*

*Akysis* and *Acrochordonichthys* resemble them in their air-bladder and anterior vertebræ (*fide* Bridge and Haddon). There is a skeleton of *Akysis major*, Bouleng., in the British Museum collection, but unfortunately this is a species

Fig. 1.




A. B. C.

A. *Clarias anguillaris.* B. *Clarotes læviceps.* C. *Liobagrus andersonii.*

Hyopalatine bones of the left side, seen from below. *pal*, palatine; *pt*, pterygoid; *ms*, mesopterygoid; *mt*, metapterygoid; *q*, quadrate; *hm*, hyomandibular; *pop*, præoperculum.

of *Glyptosternum*, whilst Koschkaroff's description and figures of the skeleton of *Akysis* are evidently based on a species of *Macrones* or some related genus.

### Family 9. Sisoridæ.

Differ from the Bagridæ in certain features of specialization, such as the absence of pterygoid and post-temporal, the contraction of the head of the hyomandibular, which articulates with the sphenotic only, and the division of the air-bladder into two lateral sacs. Lower surface of head and abdomen flat and paired fins horizontal. Nostrils close together, with a more or less developed barbel between them. Gill-membranes free (*Nangra*, *Bagarius*) or attached to isthmus. Vertebræ 34 to 40 (15–19 + 19–23); parapophysis of the fourth vertebra a lamina which is decurved anteriorly, forming a semicylinder; parapophysis of the fifth vertebra very strong, extending outwards to the skin, rarely uniting with that of the fourth to form a complete cylinder.

Asiatic fresh-water fishes.

*Synopsis of the Genera.*

I. Præcaudal vertebræ normal, with the ribs attached to simple parapophyses and the neural arches without lateral processes; end of transverse process of fifth vertebra appearing as a rugose plate behind the lateral cutaneous area.

A. Head somewhat compressed and elevated; tail and caudal vertebræ normal.

1. Mesopterygoid smaller than metapterygoid; pelvics behind the dorsal.

Gill-membranes free from isthmus ..... *Nangra.*
Gill-membranes attached to isthmus ..... *Gagata.*

2. Mesopterygoid large, extending to hyomandibular above the reduced metapterygoid; pelvics below the dorsal.
*Erethistes.*

B. Head depressed; tail long and slender; caudal vertebræ with laminar neural and hæmal spines and lateral laminar processes which may form external series of bony plates.

Pelvics behind the dorsal..... *Breitensteinia.*
Pelvics below the dorsal ..... *Sisor.*

II. Anterior præcaudal vertebræ with a series of processes on each side directed upwards and outwards from the bases of the neural arches; head depressed.

A. Lips normal; mesopterygoid large, extending forward below the palatine and backwards to the hyomandibular; complex centrum rigidly united, but not ankylosed to cranium; parapophysis of fourth vertebra a half-cylinder, of fifth a stout horizontal process ending just beneath the skin.

1. Ribs inserted on normal transverse processes; pelvics behind the dorsal; gill-membranes free or narrowly attached to isthmus.

Thorax without longitudinal plaits ..... *Bagarius.*
Thorax with longitudinal plaits; palate toothed.... *Euclyptostermum.*
Thorax with longitudinal plaits; palate toothless .. *Glyptostermum.*

2. Anterior ribs sessile, the rest on transverse processes which are forked at the base; pelvics below the dorsal; gill-membranes broadly attached to isthmus ..... *Pseudecheneis.*

B. Lips expanded and reflected; mesopterygoid not reaching hyomandibular; complex centrum ankylosed with cranium; parapophyses of fourth and fifth vertebræ united to form a complete cylinder on each side; ribs on transverse processes which are forked at the base; gill-membranes broadly attached to isthmus.

Teeth all pointed; gill-openings extending on to lower surface ..... *Parexostoma.*
Teeth all pointed; gill-openings not extending on to lower surface ..... *Euchiloglanis.*
An outer series of blunt compressed teeth..... *Exostoma.*

### Family 10. Amphiliidæ.

Closely related to the Bagridæ, but without pterygoid or post-temporal. Air-bladder reduced and divided into two lateral portions enclosed in incomplete bony cylinders formed by the laminar parapophyses of the fourth vertebra, which are decurved anteriorly, the rather feeble parapophyses of the fifth vertebra, which do not nearly reach the skin, and by two pairs of processes of the complex centrum supporting the air-bladder below. Vertebræ 35 to 41 (16–20 + 18–21). Anterior præcaudals with paired processes directed upwards and outwards from the bases of the neural arches; parapophyses widely forked at the base.

African fishes with depressed head, no nasal barbels, subterminal or inferior mouth, toothless palate, and paired fins horizontal and more or less expanded. In the structure of the vertebral column they resemble the Indian *Exostoma* and *Pseudecheneis*, and there are other interesting resemblances between members of this family and of the Sisoridæ, due to convergence.

#### *Synopsis of the Genera.*

I. Gill-membranes free from isthmus. All ribs on transverse processes; caudal vertebræ normal. (*Amphiliinæ.*)
*Amphilius, Paramphilius.*

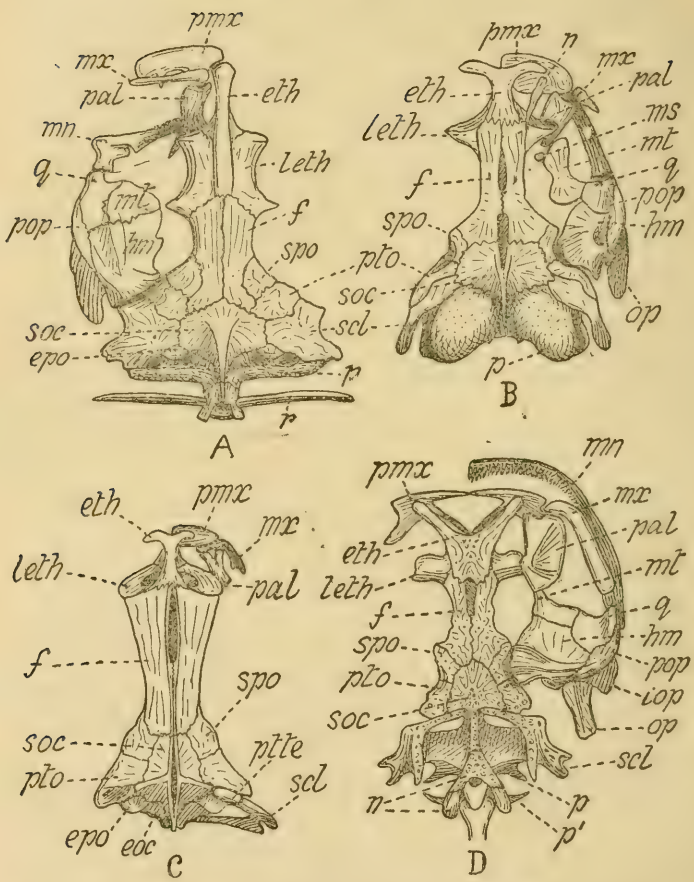
II. Gill-membranes attached to isthmus. Anterior ribs sessile; vertebræ behind dorsal fin with paired laminar processes directed upwards and outwards, those behind the pelvic fins with similar processes directed obliquely downwards, these processes reaching the skin and often expanded distally to form series of bony plates.

No bony plates ..... *Doumea.*
Series of bony plates from dorsal and pelvic fins to caudal ..... *Phractura, Paraphractura, Andersonia.*
Lower series of bony plates continued forward in advance of pelvic fins..... *Trachyglanis, Belonoglanis.*

### Family 11. Chacidæ. (Fig. 2, D.)

The Indian genus *Chaca* appears to be related to the Bagridæ, from which it differs externally in the very large strongly depressed head, the very wide mouth, the broad union of the gill-membranes with the isthmus, and the extension forward of the caudal fin above and below, simulating a second dorsal and anal. The large broad palatine articulates with the strongly projecting lateral ethmoid and posteriorly with the metapterygoid; there is no pterygoid, and

Fig. 2.




A. *Arges heterodon.* B. *Nematogenys inermis.* C. *Diplomystes papillosus.* D. *Chaca lophioides.* Head-skeleton seen from above.

*pmx*, præmaxillary; *mx*, maxillary; *mn*, lower jaw; *n*, nasal; *pal*, palatine; *ms*, mesopterygoid; *mt*, metapterygoid; *q*, quadrate; *hm*, hyomandibular; *pop*, præoperculum; *op*, operculum; *iop*, interoperculum; *eth*, mesethmoid; *leth*, lateral ethmoid: *f*, frontal; *spo*, sphenotic; *pto*, pterotic; *epo*, epiotic; *soc*, supraoccipital; *eoc*, exoccipital; *pt*, post-temporal; *scl*, supra-cleithrum; *p*, parapophysis of fourth vertebra; *p'*, parapophysis of fifth vertebra; *r*, rib of sixth vertebra; *n*, nuchal plates.

the small mesopterygoid is attached to the lower surface of the palatine. There is no post-temporal, and the supra-cleithrum is like that of the Bunocephalidæ, with the lower limb slender, the upper attached to the supraoccipital and almost reaching the neural crest of the complex vertebra, and the outer division of the stem superior, directed backwards above and united to the parapophysis of the fourth vertebra; a mesocoracoid is present and the hypocoracoids interlock below. Vertebræ 35 (10+25); free præcaudals with ribs attached inferiorly to short parapophyses; fifth parapophysis moderate, at the base laminar and united with the fourth; anterior ramus of fourth parapophysis strong, broad, united distally with the supra-cleithrum, posterior ramus relatively small, similar to the fifth parapophysis. Air-bladder large, free, partly constricted into two lateral divisions.

## Family 12. Schilbeidæ.

Closely related to the Bagridæ, but with the anal fin elongate and with the pterygoid absent; pelvic fins 6-rayed.

Indian and African fresh-water fishes; the more generalized members of the family are very near the Bagridæ, but the group is a varied one. The skull is extremely similar in all, differing from that of the Bagridæ and Amiuridæ in its straight parallel edges, the lateral ethmoids scarcely projecting outwards in front of the orbit nor the pterotics behind the articulation of the hyomandibular. The vertebræ number 47 to 58 (10–20+29–47).

The genera may be arranged as follows:—

I. Dorsal fin with a pungent spine; teeth well developed; post-temporal present; hypocoracoids interlocking below; lower limb of supra-cleithrum free. (*Schilbeinæ.*)

A. Air-bladder as in the Bagridæ; anterior vertebræ as in *Rita*; anterior ramus of parapophysis of fourth vertebra stout, connected with posterior at the base; vertebræ 11–17+30–41.

| | |
|---|---|
| African | *Schilbe, Eutropius.* |
| Indian | *Pseudeutropius, Lais, Helicophagus, Silundia.* |

B. Cavity of air-bladder divided longitudinally into two; parapophysis of fourth vertebra a lamina with the anterior and posterior edges decurved to form a semi-cylinder; vertebræ 19–20+29–33.

| | |
|---|---|
| Indian | *Schilbichthys, Eutropiichthys.* |

II. Dorsal fin small and spineless, or absent; teeth minute or absent; no post-temporal; other osteological characters of *Schilbe*; vertebræ 10–11+41–44. (*Siluranodontinæ.*)

African ..... *Siluranodon, Parailia, Physailia.*

III. Dorsal fin absent; teeth well developed; post-temporal present; hypocoracoids not meeting; air-bladder tubular, transverse, crescentic, curved forward on each side, the horns lying in a pair of recesses open behind, formed by the laminar parapophyses of the fourth and fifth vertebræ, by a ventral lamina which curves upwards anteriorly, and by the lower limb of the supra-cleithrum; vertebræ 11+41–47. (*Ailiinæ.*)

Indian ..... *Ailia, Ailichthys.*

## Family 13. Clariidæ.

Naked, elongate; gill-membranes separate, free from isthmus. Dorsal fin spineless, commencing not far behind head; anal long, many-rayed, nearly or quite reaching caudal; pelvics, when well-developed, 6-rayed; pectoral with a spine. Head depressed; mouth transverse, terminal; bands of villiform or granular teeth in jaws and on vomer; 4 pairs of barbels, nasal, maxillary, and two mandibular. Cranial roof-bones more or less expanded and laminar, the pterotics appearing as a pair of plates at the sides of the supraoccipital; epiotics concealed beneath supraoccipital; side of head with two plates, the anterior, "postorbital," attached to the frontal above and behind the orbit, the posterior, "temporal," attached to the pterotic and supracleithrum. Palatine long, rod-like; pterygoid absent; mesopterygoid large, connecting the rather small metapterygoid with vomer (fig. 1, A). Post-temporal absent; supracleithrum a plate rigidly attached to pterotic, without lower limb, with a posterior process firmly united to air-bladder capsule; mesocoracoid present; hypocoracoids interlocking below. Vertebræ 60 to 107; free præcaudals with ribs on well-developed parapophyses; complex vertebra rigidly united with fifth, first and skull, by suture and by investing bone; parapophyses of fourth and fifth vertebræ forming on each side a transverse cylinder or semi-cylinder with terminal aperture beneath the skin; air-bladder represented by two sacs enclosed in the cylinders, connected by a transverse tube from which a duct runs to the œsophagus.

Fresh-water fishes of Africa and Asia.

The Clariidæ are a specialized family, but show relationship to the Schilbeidæ. A good illustrated description of the head-skeleton of *Clarias* has been given by Schelaputin (Bull. Soc. Nat. Moscou, 1905, p. 85).

The genera may be arranged thus :—

I. Gill-cavity with an accessory air-sac, which extends backwards into the tail; dorsal fin short; no adipose fin.
*Saccobranchus.*

II. Gill-cavity with a diverticulum containing a dendritic accessory branchial organ attached to the second and fourth branchial arches; dorsal fin more or less elongate.

A. An adipose fin ..... *Heterobranchus, Dinotopterus.*

B. No adipose fin; dorsal nearly or quite reaching the caudal.

Plates at side of head connected .... *Clarias.*
Plates at side of head reduced, separated by an interspace ..... *Allabenchelys, Clarrialabes, Gymnallabes, Channalabes.*

*Saccobranchus* often placed in a separate group, is precisely similar to *Clarias* in osteological characters. The plates protecting the sides of the head are present in all the members of the family, and I have satisfied myself that Boulenger's statement to the contrary for the degraded genera allied to *Clarias* is erroneous. These plates are present in most Siluroids, but not so strongly developed; the anterior belongs to the circumorbital series, the posterior transmits the lateral line to the præoperculum.

### Family 14. Pangasiidæ.

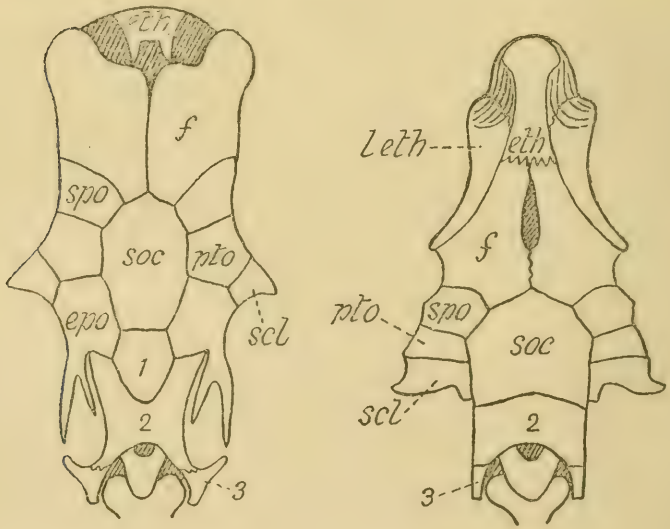
The Indian genus *Pangasius* differs from the Bagridæ externally in the long anal fin, with 28 to 40 rays; maxillary and one pair of mandibulary barbels are present, but no nasal barbels. The skeleton is very similar to that of generalized Bagridæ, differing only in the development of an elastic spring mechanism, the anterior rami of the parapophyses of the fourth vertebra being expanded distally to form a pair of oval plates inserted in the anterior wall of the air-bladder, but free from the supra-cleithrum. The air-bladder consists of an anterior division, corresponding to a normal bladder, and of a posterior tubular cæcum. Vertebræ 15 + 29.

### Family 15. Synodontidæ.

External characters of the Bagridæ, except that the gill-membranes are confluent with the skin of the isthmus; the nostrils may be close together or wide apart and there is no nasal barbel; the pelvic fins are 7-rayed. There is a broad nuchal shield with parallel edges; the epiotics are small, hidden beneath the supraoccipital; pterygoid and mesopterygoid are absent; there is no post-temporal; the upper

limb of the supra-cleithrum is a plate united with the supraoccipital and the pterotic, the lower limb is expanded vertically. The vertebræ number 33 to 44 (11–17 + 19–27); the fifth and six are rigidly united with the complex; the posterior ramus of the parapophysis of the fourth vertebra is similar to the well-developed parapophysis of the fifth, its anterior ramus is a transverse lamina, with an inferior process expanded to form a thick vertical plate, free from the supra-cleithrum, inserted in the anterior wall of the air-bladder.

Fig. 3.




Diagrams showing the cranial roof-bones of A. *Pseudauchenipterus nodosus* and B. *Euchilichthys royauxi*.

*eth*, mesethmoid; *leth*, lateral ethmoid; *f*, frontal; *soc*, supraoccipital; *spo*, sphenotic; *pto*, pterotic; *epo*, epiotic; *scl*, supra-cleithrum; 1, 2, 3, nuchal plates.

These African fresh-water fishes resemble the Bagridæ except in the characters of specialization enumerated above.

The genera may be arranged thus :—

I. Mandibulary barbels branched; maxillaries at the sides of the præmaxillaries; parapophyses of sixth vertebra normal.
*Synodontis, Microsynodontis, Mochocus.*

II. Barbels simple; maxillaries behind the præmaxillaries; parapophyses of sixth vertebra very strong; head depressed; mouth with a papillose circular lip.
*Chiloglanis, Euchilichthys, Atopochilus.*

The Synodontidæ resemble the South American Doradidæ to a certain extent in their restricted gill-openings, nuchal shield, and elastic spring apparatus. But in the Doradidæ the epiotics are prominent cranial roof-bones which join the nuchal plates (fig. 3, A), a mesopterygoid is present but a mesocoracoid absent, the fourth parapophysis is not divided into anterior and posterior rami and its distal plate is attached to the lateral instead of the anterior wall of the air-bladder, and the fifth parapophysis is vestigial or absent.

### Family 16. Malopteruridæ.

The African *Malopterurus electricus* differs from the Bagridæ in the absence of the dorsal fin, the restricted gill-openings, and the development of a subcutaneous electric organ extending over the whole body. Osteological characters indicate relationship to the Bagridæ, but there are several features of specialization. Pterygoid and mesopterygoid are absent, the metapterygoid is firmly connected with a horizontal ledge formed by the lateral ethmoid and orbitosphenoid, and the quadrate extends forward external to the metapterygoid to meet the extremity of the recurved præmaxillary. The skull is narrowed and compressed between the orbits and strongly expanded and depressed behind them, and the sphenotic sends out a strong lateral process to above the eye. The pectoral arch is rather loosely attached, the upper limb of the supracleithrum articulating in a socket between the post-temporal and the epiotic, the lower limb connected to the basioccipital by ligament. The vertebræ number 41 to 44 (20–22 + 21–22); the anterior ramus of the parapophysis of the fourth vertebra is free from the supracleithrum, thin proximally and expanded distally into a transverse vertical plate, inserted in the anterior wall of the air-bladder. The air-bladder has a large posterior sac, connected by a tube with the smaller anterior division, which represents a normal bladder.

### Family 17. Pimelodidæ.

Gill-membranes separate, free from isthmus. Dorsal fin typically anterior and with a spine (above or behind the pelvics and without a spine in *Heptapterus* and *Nannoglanis*); adipose fin present; anal short or of moderate length;

pelvics 6-rayed. Barbels three pairs, maxillary and two mandibular; anterior and posterior nostrils wide apart. Jaws toothed; palate with or without teeth. Palatine rod-like, articulating with the side of the lateral ethmoid; pterygoid, when present, slender, having the appearance of an ossified ligament connecting palatine and mesopterygoid; latter small, lying between the well-developed metapterygoid and the lateral ethmoid. Post-temporal present; supra-cleithrum firmly attached to skull, with a well-developed lower limb; mesocoracoid present; hypocoracoids meeting and interlocking behind the symphysis of the cleithra. Vertebræ 42 to 60 (15–20+25–43); ribs on parapophyses; parapophysis of fourth vertebra a horizontal lamina with a more or less distinct stout anterior ramus which is rigidly united with the stem of the supra-cleithrum; air-bladder typically large and free.

Neotropical, fresh water fishes.

This family is closely related to the Indian and African family Bagridæ; it includes a number of diverse types, but is undoubtedly a natural group.

The absence of a nasal barbel usually distinguishes the Pimelodidæ from the Bagridæ, and the few Bagridæ which have no nasal barbel differ from the Pimelodidæ in their united gill-membranes. The skeleton of the two families is extremely similar, but the lateral ethmoid facet for articulation of the palatine is hardly ever strictly lateral in the Bagridæ, and the pterygoid, when present in the Pimelodidæ, is unlike that of either the Chrysichthyinæ or the Bagrinæ. Since the two groups are large, varied, and geographically distinct, and seem to form the starting-point for the evolution of most of the Siluroids of South America and of Asia and Africa respectively, it seems best to recognize them as distinct families.

The following arrangement includes many of the principal genera, but some I have not seen and am unable to place :—

I. Pterygoid present, slender, attached anteriorly to lower surface of palatine and posteriorly to outer end of the transverse, crescentic mesopterygoid; parapophyses of fourth, fifth, and sixth vertebræ laminar, united by suture; air-bladder normal.
*Callophysus, Pimelodus, Piramutana, Sciades.*

II. Pterygoid absent; mesopterygoid laminar, attached in front to lower face of lateral ethmoid and behind to anterior edge of metapterygoid; air-bladder normal.

A. Anterior and posterior rami of parapophysis of fourth vertebra connected at the base only; sixth vertebra free, with normal transverse process ..... *Pimelodella, Rhamdia, Heptapterus, Nannoglanis.*

B. Anterior ramus of parapophysis of fourth vertebra only distinct distally; sixth vertebra with a laminar transverse process united by suture with that of the fifth.
*Hemisorubim, Pseudoplatystoma.*

III. Pterygoid absent; mesopterygoid laminar, attached to lateral ethmoid, but connected with metapterygoid only by ligament; parapophysis of fourth vertebra a lamina decurved anteriorly, not divided into rami, united with the fifth basally; sixth vertebra free; air-bladder large, free, partly constricted into two lateral sacs; head broad, depressed.... *Pseudopimelodus.*

IV. Pterygoid absent; mesopterygoid a small lamina attached to lower surface of lateral ethmoid and to metapterygoid, which is produced forward external to it; parapophysis of fourth vertebra united with fifth, curved to form a semi-cylinder open behind, containing the lateral portion of the reduced and divided air-bladder; sixth vertebra not free, but with normal parapophyses.
*Luciopimelodus.*

V. Pterygoid absent; mesopterygoid small, articulated with posterior face of lateral ethmoid and with metapterygoid, which extends forward below the lateral ethmoid; parapophyses of fourth, fifth, and sixth vertebræ laminar, united by suture; air-bladder normal.
*Sorubim, Platystomatichthys.*

## Family 18. Helogenidæ.

The South American genus *Helogenes* differs externally from the Pimelodidæ in the fins, as the dorsal is spineless, median in position, followed by a small adipose fin and placed above the long anal, which has 42 rays. The air-bladder is free, of moderate size, placed transversely, and incompletely divided into two compartments. The upper limb of the supra-cleithrum seems to be only loosely attached to the skull and the hypocoracoids do not form a symphysis.

The relations of this genus appear to be about equally close with the Pimelodidæ and with *Cetopsis*; one of the types has been partly dissected for examination of the air-bladder, but until a skeleton is available the exact position of *Helogenes* must remain uncertain.

## Family 19. Hypophthalmidæ.

The neotropical genus *Hypophthalmus* differs from the Pimelodidæ externally in the toothless mouth, ventro-lateral position of the eyes, very wide gill-openings, very long many-rayed anal fin, and insertion of the pelvic fins in advance of the dorsal. The lower pharyngeals are united to form a Y-shaped bone with long anterior stem lying in the narrow isthmus and with small toothed posterior forks. The air-bladder is reduced to two small sacs, each enclosed in a bony capsule with a lateral opening beneath the skin,

formed by the parapophyses of the fourth and fifth vertebræ and by the upper limb of the supra-cleithrum. The vertebræ number 66 (14+52), the first five ankylosed; the ribs are inserted on parapophyses.

### Family 20. Trichomycteridæ. (Fig. 2, B.)

Body naked, moderately elongate. Gill-openings wide or restricted. Dorsal fin short, without spine; no adipose fin; anal short or moderately long; pelvics 5- or 6-rayed. Nostrils remote, the anterior sometimes with a barbel; teeth in jaws villiform or incisor-like; palate sometimes toothed. Palatine broad; pterygoid absent; mesopterygoid, when present, very small, attached to inner edge of metapterygoid, which joins palatine. Skull depressed, contracted between and expanded behind the orbits. Post-temporal absent; upper limb of supra-cleithrum suturally united to supraoccipital and pterotic; mesocoracoid present; hypocoracoids narrowed forward below, pointed anteriorly, not interlocking. Vertebræ 42 to 46 (19–21+23–25); ribs on parapophyses; fifth vertebra ankylosed with the complex, which is short, rigidly attached or ankylosed to the skull, and bears a pair of transverse subcylindrical capsules with lateral openings; air-bladder divided into two lateral sacs enclosed in the bony capsules.

Fresh-water fishes of South America.

The principal genera may be arranged thus:—

I. Air-bladder capsule formed by the parapophysis of the fourth vertebra, in front free from the skull and normally attached to the supra-cleithrum, behind free from the normal parapophysis of the fifth vertebra; dorsal fin anterior; opercles unarmed; one pair of maxillary barbels. (*Cetopsinæ.*)

*Cetopsis.*

II. Air-bladder capsule united to the skull, its anterior wall including the lower limb of supra-cleithrum and a part of the exoccipital and epiotic bones; parapophysis of fifth vertebra not developed as a separate process; dorsal fin median or posterior. (*Trichomycterinæ.*)

A. Opercles unarmed; one pair of maxillary barbels.

*Nematogenys.*

B. Operculum and interoperculum armed with spines.

One pair of maxillary barbels ..... *Stegophilus, Vandellia.*
Two pairs of maxillary barbels ..... *Trichomycterus, Eremophilus, Tridens, Pariodon, Miuroglanis.*

### Family 21. Bunocephalidæ.

Gill-openings reduced to a small foramen in front of the pectoral fin. Dorsal fin anterior; no adipose fin; caudal

small, few-rayed; anal short or long; pelvics 6-rayed, below the dorsal. Head depressed; nostrils remote, without barbel; villiform teeth in the jaws; palate toothless. Palatine rod like; mesopterygoid, when present, small, attached to lateral ethmoid; operculum reduced, scarcely larger than a branchiostegal ray, but attached anteriorly to the interoperculum. Skull depressed, the pterotics with strong lateral laminar projections. No post-temporal; supra-cleithrum forked, the lower limb slender, running to basioccipital, the upper extending nearly to the middle of the supraoccipital; no mesocoracoid; hypocoracoids interlocking below. Vertebræ 34 to 75 (10+24–65), strongly compressed, with laminar neural and hæmal spines and with a series of horizontal lateral processes arising on each side from the middle of the centra; free præcaudal vertebræ without parapophyses, with sessile ribs; fifth vertebra rather long, rigidly united with complex, their neural spines forming a low ridge of bone with thickened dorsal edge which joins the supraoccipital anteriorly; parapophysis of fifth vertebra a very strong process; parapophysis of fourth a lamina, united posteriorly to the base of the fifth, anteriorly decurved and united to the stem of the supra-cleithrum. Air-bladder large, free, partly constricted into two lateral portions.

South-American fresh-water fishes.

*Bunocephalus*, *Bunocephalichthys* and *Dysichthys* have a short tail, anal 5- to 9-rayed, and about 24 caudal vertebræ. *Platystacus* (*Aspredo*) has a long tail, anal 50- to 60-rayed, and 60 or more caudal vertebræ.

### Family 22. Callichthyidæ.

Body armoured with two series of overlapping bony laminæ on each side. Gill-membranes broadly united to isthmus. Dorsal fin anterior; adipose fin with a spine; anal short; pelvics below the dorsal. Mouth small, terminal; præmaxillaries small, movably attached to mesethmoid; rami of lower jaw slender; jaws with or without feeble teeth; palate toothless; one or two pairs of maxillary barbels. Palatine articulating with anterior end of lateral ethmoid; pterygoid and mesopterygoid absent; anterior end of metapterygoid connected with lateral ethmoid and palatine by a ligament. Bones of cranial roof more or less expanded and plate-like; suborbitals well-ossified, with an inner shelf; operculum large. Post-temporal absent; supra-cleithrum a large plate ankylosed with the pterotic, connected with sphenotic and supra-occipital above, prootic

and exoccipital below, and parapophysis of fourth vertebra behind; cleithrum transversely expanded; mesocoracoid present; hypocoracoids interlocking below. Vertebræ 27–32 (13–18+12–14); caudal vertebræ normal, with slender neural and hæmal spines; præcaudal vertebræ, from seventh to last, with slender ribs, all (*Corydoras*) or the anterior sessile; sixth vertebra free, with a strong rib supporting the first lateral plate of the lower series, borne on a stout parapophysis which articulates with that of the fifth vertebra; complex vertebra ankylosed with fifth and with skull, its parapophyses forming with the supra-cleithra and exoccipitals a pair of subcylindrical capsules opening laterally beneath clefts in the supra-cleithral plates; air-bladder divided into two sacs enclosed in the capsules.

South-American fresh-water fishes.

Genera: *Scleromystax, Callichthys, Hoplosternum, Decapogon, Dianema, Corydoras.*

### Family 23. Loricariidæ. (Fig. 2, A.)

Body naked, or armoured with bony scutes, which anteriorly form five longitudinal series on each side. Gill-membranes broadly united to isthmus. Dorsal fin anterior; anal short; pelvics below or in advance of the dorsal. Mouth inferior, with expanded lips forming a sucker; præmaxillaries movably articulated with mesethmoid; jaws toothed; palate toothless; a pair of maxillary barbels. Palatine articulating with anterior end of lateral ethmoid; pterygoid and mesopterygoid absent. Post-temporal absent; supra-cleithrum a large plate united with pterotic and supra-occipital above, prootic and exoccipital below, and parapophysis of fourth vertebra behind; cleithrum transversely expanded; mesocoracoid present. Vertebræ 27 to 38 (10–18+14–26); caudal vertebræ compressed, with neural and hæmal spines more or less expanded; free præcaudals without parapophyses, with sessile ribs; a pair of very strong sessile ribs borne by the sixth vertebra, which is rigidly united to the fifth and articulates with the seventh by a hinge which restricts lateral movement; complex vertebra united to fifth and to skull by suture or ankylosis; parapophyses of fifth vertebra absent, of fourth forming with supra-cleithra and exoccipitals a pair of capsules opening laterally beneath the notched or perforted supra-cleithral plates; air-bladder reduced to two sacs enclosed in the capsules.

South-American fresh-water fishes.

In 1904 (Trans. Zool. Soc. xvii. pt. 3) I arranged the genera in five subfamilies; these may be grouped as follows:—

I. Pharyngeals toothless; hæmal spines not bifid; supra-cleithral plate extending downwards, its inner surface attached to the outer edge of the cleithrum, but not forming a definite articulation with it; body usually armoured; inner edge of metapterygoid attached to lateral ethmoid; hypocoracoids interlocking. *Plecostominæ, Hypoptopomatinæ.*

II. Lower and fourth upper pharyngeals toothed; anterior hæmal spines bifid for reception of anal basalia; supra-cleithral plate scarcely decurved, its lower surface with a transverse ridge fitting a groove on the upper edge of the supra-cleithral expansion external to the head of the bone.

| | |
|---|---|
| Body armoured; metapterygoid attached to lateral ethmoid; lower portions of cleithra transverse; hypocoracoids interlocking below ..... | *Loricariinæ, Neoplecostominæ.* |
| Body naked; metapterygoid small, not reaching skull; cleithra running somewhat forward to their symphysis; hypocoracoids tapering forward below, not interlocking .... | *Argiinæ.* |

It seems to me that if the Argiidæ are to be separated off as a distinct family, the Plecostomidæ also should be recognized, as they differ quite as much from the Loricariidæ.

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## LXVI.—*New Species of Heterocera from Costa Rica.*—XI.

By W. Schaus, F.Z.S.

### Geometridæ.

*Aplogompha argentilinea*, sp. n.

♂. Palpi and frons lilacine buff; vertex, collar, and thorax dull lilacine brown; abdomen dark brown above, silvery grey below. Fore wings: the basal half to middle of costa and postmedial line on inner margin black-brown, crossed by some buff striæ, and containing a few metallic scales in cell outwardly, followed by a large triangular whitish space shaded with fuscous scales and with its apex at vein 2, its costal area shaded with buff; a postmedial dark reddish-brown line, followed by fine buff and dark brown lines, and a heavy silvery line outwardly shaded with black and not reaching costa; a dull buff-grey space beyond the silver line limited by a straight subterminal white line, beyond which

the margin is reddish brown. Hind wings: the costal margin broadly whitish grey to subterminal; the base fuscous brown, crossed by buff striæ and spots; a broad grey shade beyond cell, narrowing towards but not reaching inner margin, followed by dark brown and buff; the silvery line interrupted and crossing large dark brown spots; the subterminal line silvery, outwardly shaded with dark brown between the veins; the apex dark brown.

Expanse 23 mm.

*Hab.* Juan Vinas.

*Opisthoxia interrupta*, sp. n.

♂. Palpi brown. Frons dark velvety brown, with some greyish shading below. Vertex, collar, and thorax dark silvery grey. Abdomen grey, finely irrorated with fuscous. Fore wings lilacine grey, with some darker irrorations; ocellus large, black, edged with ochreous and then brown, containing some silvery scales within it in front and some behind on the brown shading; a subterminal brown shade, outwardly edged with silver, slightly outcurved at costa, incurved and partly interrupted between 6 and 4, then straight to tornus; cilia iridescent grey or brown. Hind wings grey, the postmedial area broadly shaded with dark brown, with still darker postmedial and subterminal shades, the whole irrorated with silver; the base irrorated with dark brown; a broad fuscous shade on discocellular; the outer margin grey, with fine dark lines, and some marginal silvery spots, those between 2 and 4 larger, and edged with black points on either side.

Expanse 26 mm.

*Hab.* Juan Vinas, Sitio, Tuis.

The female of this species was erroneously made the female of *O. melae*, Dr., in the 'Biologia.'

*Berberodes trilinea*, sp. n.

♂. Palpi, head, and neck dark brown; tegulæ, thorax, and abdomen silvery white, the latter with a dorsal fuscous-brown spot terminally and with long ventral tufts of creamy-white hairs; legs shaded with brown. Wings silvery white; some pale brown striæ on outer and inner margins; medial and postmedial fine, pale, brown lines; a terminal dark brown line. Fore wings: a fine antemedial line; costa narrowly yellow, irrorated with golden scales, and with black spots along extreme margin. Underneath white.

Expanse 28 mm.

*Hab.* Juan Vinas, Tuis.

*Bapta argentata*, sp. n.

♂. Palpi and head brown; body white; fore legs streaked with light brown; mid and hind legs with yellowish brown. Wings white, irrorated with silvery-white scales; cilia white; minute black discal points; a fine postmedial fuscous-grey line; some subterminal black irrorations. Fore wings: the costa very finely yellowish brown; traces of an antemedial line on inner margin. Underneath white.

Expanse 34 mm.

*Hab.* Juan Vinas.

This is the *B. fulvicosta* of the 'Biologia,' but does not agree with Walker's type in the collection of Mr. Druce.

*Bapta candida*, sp. n.

♂. Palpi and head brown; body white; legs streaked with yellowish brown. Wings silvery white, the outer margin thinly irrorated with black; terminal black irrorations forming a fine line; a postmedial fuscous-grey line, with darker scales on veins; black discal points. Fore wings: a fine antemedial line not reaching costa; the costa finely yellowish brown.

Expanse 27 mm.

*Hab.* Juan Vinas, Poas.

Smaller than *B. argentata*, Schs., which has the termen white.

*Bapta molesta*, sp. n.

♂. Palpi and frons reddish brown. Body and wings white, faintly tinged with yellowish. Wings: black discal points; a postmedial and a subterminal pale brownish shade formed by dark irrorations; a terminal dark brown line. Fore wings: the costa finely yellowish brown; an outbent antemedial fuscous line from cell to middle of inner margin.

Expanse 24 mm.

*Hab.* Juan Vinas, Tuis.

*Cyclomia disparilis*, sp. n.

♂. Body and wings above purplish black. Fore wings: a fine curved black antemedial line and a similar less distinct medial line, the latter followed by a brown discocellular spot edged with black; a sinuous black postmedial line irregularly spotted with light brown; marginal buff-brown mottlings between veins 3 and 4 and from vein 5 to apex; some light brown spots on costal edge; a terminal black line

with buff-brown points at veins. Hind wings: the costa to postmedial roseate buff, widest medially, and containing a black spot; a black antemedial line on inner margin; the postmedial black, and a buff-brown line from it at vein 3 to anal angle; a marginal buff-brown spot between 3 and 4. Body and wings below yellow, irrorated and striated with purple. Fore wings: the inner margin silky grey; a broad subterminal purple band; some purple in and beyond cell. Hind wings: the subterminal purple band expanding to termen above vein 4; a fine antemedial line; the discal spot on both wings ochreous.

Expanse 19 mm.

Female purplish brown; the medial line distinct; the postmedial buff-brown, edged with dark violaceous brown; no pale space on costa of hind wings; the marginal mottlings less distinct. Underneath the markings less contrasted than in the male.

Expanse 19 mm.

*Hab.* Juan Vinas, Guapiles, Sixola.

*Semiothisa guapilaria*, sp. n.

♂. Body and wings violaceous brown, finely irrorated with whitish; the lines dark brown, shaded with ochreous brown; the postmedial line crenulate; a terminal dark brown line; cilia light brown, with fuscous spots. Fore wings faintly excavated below apex; the costa spotted with black and orange-brown; the lines starting from reddish-brown costal spots; the antemedial outcurved in cell, wavy; the medial perpendicular, finely wavy; the postmedial outwardly shaded with black between 3 and 4, and followed by a small black spot; also followed from 6 to costa by a reddish-brown shade and a white point between 6 and 7. Hind wings: a wavy medial line and a black spot on discocellular; a faint subterminal fine brown line; the outer margin angled at vein 4. Fore wings below black, mottled with orange-brown striæ, chiefly on costa and postmedially; the veins terminally orange-brown; a white spot between 6 and 7. Hind wings below fuscous grey; the veins brownish; some irregular small white spots medially and terminally.

Expanse 24 mm.

*Hab.* Guapiles, Carillo.

*Semiothisa poasaria*, sp. n.

Palpi and vertex mottled brown and white; frons light brown. Body whitish grey; a transverse dark brown line

on collar; some dark brown irrorations on thorax and paired dorsal spots on abdomen. Wings whitish grey, thinly irrorated and striated with grey. Fore wings excised from 7–4, inwardly oblique below 4; the lines starting from brown costal streaks; the antemedial outcurved, wavy, fine, ochreous brown, with some black irrorations chiefly on veins; the medial similar, wavy, with black irrorations only on veins; postmedial outcurved, white from vein 7–2, otherwise ochreous brown, followed from below 3 to 5 by a large dark brown spot cut by veins 3 and 4, and preceded by a similar brown narrow space interrupted between 3 and 4; similar smaller spots from below 6 to above 7 outwardly, and a dark line inwardly from 6–7; outer margin shaded with brown, with darker striæ; a whitish shade from below 7 to apex. Hind wings: a fuscous-grey antemedial line; a black discal point; the postmedial fine, punctiform, especially on 3 and 4, followed by a broad dark brown shade cut by veins 3 and 4, which are whitish; the terminal area whitish grey, with darker striæ; the margin crenulate and deeply angled at vein 4. Underneath buff-white, with brown striæ; the medial line and a basal line almost black, wavy, heavily marked; the postmedial similar, shaded outwardly with ochreous brown and geminate on fore wings, the dark portion extending along costa to apex; the white apical space as above.

Expanse 35 mm.

*Hab.* Volcano Poas.

Bears a superficial resemblance to *S. enotata*, Gn.

*Microsemia consociata*, sp. n.

♂. Palpi and frons brown; vertex whitish; body and wings bone-colour; the outer space beyond postmedial line tinged with grey. Fore wings: some black irrorations on costal and outer margin; a subbasal curved line of black irrorations; antemedial fine, reddish brown, angled in cell, shaded inwardly with grey, and with a black point on subcostal; a black discal point; postmedial fine, reddish brown, from costa before apex to middle of inner margin, outwardly shaded with greyish and marked by black points, the largest on veins 6–8; subterminal black spots on veins 2–5, the largest on vein 3; terminal black points at veins. Hind wings: a black subbasal line; a black discal point; the postmedial reddish brown, outwardly shaded with grey, straight and without spots; subterminal points on veins and a large black spot on inner margin; termen as on fore wings.

Underneath white; the postmedial line heavier, black; black irrorations on outer margins and black discal points. Fore wings: subterminal spots coalescing; a broad black antemedial shade not reaching costa.

Expanse 23 mm.

Female: the black irrorations more evenly spread over wings; the points on postmedial less distinct; subterminal spots faintly indicated on vein 5; the outer margins more distinctly angled.

Expanse 26 mm.

*Hab.* Juan Vinas.

Closely allied to *M. attenuata*, Dogn.

*Pseudapicia merana*, sp. n.

♂. Palpi dark grey; frons paler grey, with fuscous irrorations; vertex, collar, thorax, and abdomen dorsally to beyond middle rust-red, terminally greyish. Body and wings underneath yellowish buff. Wings above rust-red, mottled medially with bright yellow. Fore wings: an irregular reddish-brown antemedial line preceded by grey points on veins; similar points follow the postmedial line, which is also reddish brown, incurved between 6 and 4, sinuous and inbent below 3; subterminal fuscous and grey points. Hind wings: a postmedial irregular line; some yellow mottling at apex; the outer margins are faintly angled.

Expanse 30 mm.

Female: wings yellow, slightly striated with purplish brown. Fore wings: the base and postmedial space from line to subterminal spots purplish brown. Hind wings: the base and inner margin narrowly purplish brown; similar postmedial spots partly coalescing and containing white points on veins; a subterminal series of small purplish spots.

Expanse 36 mm.

*Hab.* Juan Vinas, Sitio.

The female is figured in the 'Biologia' as that sex of *Apicia mera*, Dr., but *mera* has the sexes similar.

*Cimicodes purpurea*, sp. n.

♂. Palpi and head fuscous, the palpi laterally streaked with olive-brown. Collar pale greenish yellow. Thorax and abdomen reddish brown, the latter fuscous grey terminally. Wings dark brown, tinged with lilacine and thinly streaked with black. Fore wings: the costal margin yellowish buff, becoming whitish below subcostal, and above it irrorated and striated with black. The lines from whitish shade along

subcostal; the antemedial slightly oblique outwardly, fine, lilacine, outwardly shaded with reddish brown; a black discal point circled with lilacine and an oblique reddish-brown medial shade from it to inner margin; the postmedial slightly incurved, fine, lilacine, inwardly edged with reddish brown, and with a whitish-buff point on submedian; a curved whitish line before apex, continuing as a subterminal reddish-brown line from just above vein 7 to vein 5, then considerably inset and oblique to tornus, followed on veins by fine whitish-buff spots. Hind wings: a reddish-brown antemedial line straight to vein 2, then slightly incurved to inner margin near angle, with buff points on veins 1 and 2; a postmedial outcurved line from vein 5 to angle and an incurved line from costa at apex to vein 5; the lines outwardly shaded with lilacine; the postmedial and subapical lines also followed by buff points on veins; the outer margin tinged with reddish brown. Underneath fuscous grey, tinged with lilacine, with numerous faint black striæ and irrorations.

Expanse ♁2 mm.

Female pale olive-brown; the collar and costa dark lilacine grey; the extreme costa buff, striated with black; the lines reddish brown; no medial line; the postmedial outwardly whitish and punctiform, the whitish continuing below costa and angled on costa near subterminal; the subterminal lines fainter; cilia reddish brown, tipped with lilacine.

Expanse 56 mm.

*Hab.* Carillo, Tuis, Sixola.

### *Microgonia bilinea*, sp. n.

♂. Head and thorax olive-brown; abdomen greyish brown. Fore wings olive-brown, thinly striated with black; a dull brown antemedial line forming three outcurves and with white points on median and submedian; a black discal point; postmedial heavily marked, geminate, black, separated by a greyish line, the inner part of line angled at vein 7 and incurved to costa, faintly marked, the outer part to apex, which is much suffused with black; a lilacine buff shade beyond line, expanding to tornus and crossed by an irregular darker shade. Hind wings olive-brown to medial line, which is heavily marked, black, and is followed by a broad lilacine buff shade, limited by a dark greyish dentate subterminal shade; the outer margin somewhat darker than postmedial space; a large black spot postmedially below costa. Underneath lilacine buff, striated and irrorated with black; black discal points. Fore wings: the postmedial

line finer, geminate; a terminal clearer and paler shade. Hind wings: the medial line fine, black; a curved postmedial row of black points; some faint subterminal reddish-brown shadings.

Expanse 80 mm.

*Hab.* Juan Vinas.

Allied to *M. agliata*, Gn., and *M. umbrosa*, Schs.

*Microgonia sinuosa*, sp. n.

♂. Palpi, head, and collar olive-buff. Thorax olive-grey. Abdomen above olive-green. Fore wings: the costa finely olive-brown; base to middle at discocellular and below vein 4 to outer line silvery grey, heavily striated with fuscous grey, forming a broad medial shade on which the inner black line is faintly discernible; this line outangled in cell near the small black discal point, inbent, sinuous to inner margin, with whitish points on veins; outer area above vein 4 to costa and apex dull pale olive-green, with a few dark striæ; the outer line very oblique from costa, angled at vein 7 near termen, incurved, sinuous to inner margin at two-thirds from base, lilacine white, edged with reddish brown and with white points on veins; the terminal area below 4 strongly suffused with black; a large whitish-buff spot on inner margin close to postmedial and cut by submedian. Hind wings dull olive, with greyish striæ at base and fuscous striæ on outer half; a fine whitish postmedial line; subterminal whitish streaks on veins, inset on vein 4. Fore wings below olive-grey, tinged with brown towards apex and on outer margin from 2–7, crossed by darker striæ; the apex whitish; the outer line from vein 7 near termen incurved to beyond middle of inner margin, white, inwardly shaded with dark olive-brown. Hind wings below olive-grey, much paler on outer margin; the veins olive-brown; the outer line as on fore wings, perpendicular from costa to vein 3, then slightly lunular to inner margin; the termen finely and cilia dark brown, the latter tipped with white.

Expanse, ♂ 57, ♀ 65 mm.

*Hab.* Juan Vinas, Tuis, Sixola.

Allied to *M. sericearia*, Wlk., = *artaxa*, Dr., and *M. mexicata*, Gn.

*Microgonia extranea*, sp. n.

♂. Palpi dark brown. Frons brown, a white line between antennæ. Vertex, collar, and thorax reddish brown. Abdomen buff-brown. Wings brown, with a few black irrorations.

Fore wings: a fine, darker brown, antemedial, perpendicular line, marked by sulphur-yellow spots on veins, the spot on submedian larger and extending to inner margin; a round dark greyish discal spot containing a velvety-black point; a very fine darker brown outer line also marked by sulphur-yellow points, starting from a large yellowish-brown costal spot, followed by a small cluster of black scales. Hind wings: a minute black discal point; a finely lunular postmedial line, outwardly shaded with sulphur-yellow, more marked on veins. Wings below brownish grey, irrorated with black; black discal points, traces of a fine fuscous outer line, followed by a faint reddish-brown shade; the termen narrowly shaded with white; a subterminal dentate whitish line on fore wings from costa to vein 5.

Expanse 51 mm.

Female: fore wings reddish brown, shaded with violaceous in cell and with violaceous and darker reddish-brown striæ; antemedial line darker, shaded with grey and more outcurved between veins, but with the same sulphur-yellow spots; discal spot larger; the postmedial as in the male; the costal spot more suffused with reddish brown; a subterminal fuscous dentate shade; in both sexes the postmedial is followed by a brighter shade. Hind wings reddish brown, shaded with fuscous on basal half and with black striæ; a subterminal fuscous shade. Underneath absolutely similar to the male.

Expanse 49 mm.

*Hab.* Turrialba, Juan Vinas.

The female has a strong resemblance to *M. zarina*, Dogn.

*Microgonia sixola*, sp. n.

♂. Palpi black, tipped with grey. Head and front of collar black; collar otherwise, thorax, and abdomen light grey. Wings grey, with a few black irrorations. Fore wings: antemedial brownish points on median and submedian; a black discal point; a postmedial darker grey slightly lunular line, marked by fuscous points on veins, which are followed by short whitish streaks; a cluster of black scales crosses the line at vein 3; a brown costal spot before apex, mottled with lighter brown; the termen narrowly white; cilia olive-brown. Hind wings: the outer half darker grey; a black discal point; the postmedial line, termen, and cilia as on fore wings; a subterminal dentate dark grey shade near anal angle. Underneath grey, thinly

irrorated with black; black discal points. In some specimens the lines are almost obsolete, also the black scales at vein 3.

Expanse 40 mm.

*Hab.* Sixola, Juan Vinas, Guapiles, Tuis.

Allied to *M. cyclopeata*, Mösch., and *punctilinea*, Warr.

*Microgonia singularis*, sp. n.

♀. Palpi fuscous. Head dull brown. Collar and thorax fuscous brown. Abdomen above fuscous grey, underneath fuscous brown. Fore wings fuscous; the inner margin narrowly, the outer margin broadly buff-brown, with dark striæ; some buff-brown striæ beyond cell and brownish striæ on costa; the outer edge of dark space incurved below vein 4; a velvety-black discal spot; the termen shaded with fuscous from vein 3 to apex; terminal black points. Hind wings fuscous, some buff-brown shading at anal angle. Underneath fuscous; a faint darker subterminal line, marked by buff points on veins.

Without a male it is impossible to place this species correctly.

Expanse 55 mm.

*Hab.* Sitio, Juan Vinas.

*Herbita divisa*, sp. n.

♀. Palpi brown. Body and wings roseate buff. Fore wings: a fine, fuscous, curved, antemedial line, somewhat interrupted and punctiform on veins; a black discal point; postmedial line fine, black, starting from a triangular costal spot, the inner portion of which does not reach costa, slightly incurved between 6 and 5, then straight; subterminal black points on veins. Hind wings: some scattered black striæ; the postmedial straight, black, widest on inner margin; a dentate subterminal black line above anal angle. Underneath similar, the line almost obsolescent.

Expanse 48 mm.

*Hab.* Poas.

Allied to *H. medama*, Dr., but so different to any of the variable females of that species that I consider it distinct.

*Bonatea præclara*, sp. n.

♀. Palpi brown. Head, collar, and thorax rust-brown. Abdomen buff-brown. Fore wings ochreous buff, almost obliterated from base to outer line by thick coalescing rust-brown striæ; only a few striæ on outer margin and a sub-

terminal rust-brown line, wavy and interrupted, deeply dentate from vein 3 to inner margin; lines dark olive-brown, crossed by a line of lilacine white scales, and finely edged on medial side with reddish brown; the antemedial wavy; the outer line angled at vein 7 and crenulate, followed on costa by a grey and brown spot edged with whitish; a black discal point. Hind wings fuscous, tinged with rust-brown on inner margin and subterminally; a black discal point; a postmedial crenulate brown-black line, outwardly edged with grey; termen whitish buff, with some fuscous and brown striæ; cilia rust-brown from vein 6 to anal angle, whitish buff above 6. Underneath lilacine grey, with some brown irrorations; black discal points; a fine crenulate outer line, followed by a broad rust-brown shade; the termen broadly white from vein 5 to apex on fore wings and from apex to anal angle on hind wings.

Expanse 70 mm.

*Hab.* Tuis.

*Cirsodes aggerata*, sp. n.

♂. Palpi olive-brown, third joint whitish buff; frons whitish buff below, dark brown above and on vertex, with a whitish-buff shade between antennæ. Collar, thorax, and abdomen above olivaceous grey-brown. Body below and legs buff, irrorated with black. Wings above olivaceous grey-brown, with a few scattered black scales and terminal black points at veins. Fore wings: a fine brownish antemedial line, punctiform on veins; a faintly darker shade at end of cell; outer line angled below costa near apex, fine, dark reddish brown to inner margin at 5 mm. from tornus. Hind wings: a fine dark outer line, slightly thickened on veins; a faint subterminal dentate shade. Wings below whitish buff, with large violaceous irrorations; the lines replaced by broad violaceous-grey shades. Fore wings: a subterminal dentate shade and some reddish-brown mottling from vein 3 to costa and on discal spot. Hind wings: a small discal spot; subterminal fuscous and reddish-brown points.

Expanse 40 mm.

Female: collar and thorax olivaceous buff. Abdomen and wings pale buff, thickly irrorated with violaceous black; the lines fine dark brown. Underneath whiter, with grey and black irrorations; the lines fine as above. Fore wings: a brownish discal spot and a large reddish-brown shade across

outer line to costa; no subterminal markings. The apex of fore wings more produced and acute than in the male.

Expanse 46 mm.

*Hab.* Juan Vinas, Poas.

*Sabulodes turmalis*, sp. n.

♂. Body buff, the abdomen and legs thinly irrorated with black. Fore wings buff; the costal margin shaded with light brown; the extreme edge dark brown, spotted with white except medially; an indistinct broad antemedial shade, fuscous, with a brown spot on costa and inner margin; a black discal point; a reddish-brown postmedial shade from vein 6 to costa; the outer line from a white costal spot, lunular between the veins, reddish brown to vein 5, then darker, inset and geminate on vein 4, and incurved to just beyond middle of inner margin, followed by some whitish scales and a dark greyish shade; the terminal space brownish buff, with traces of a darker subterminal shade; the veins terminally and spots on cilia reddish brown. Hind wings whitish buff, with a few black irrorations; a minute discal point; a postmedial row of dark brown points on veins; cilia with pale reddish-brown spots. Underneath buff-white, with scattered black irrorations; black-brown discal spots and postmedial similar spots on veins, connected on fore wings by a brown shade from vein 3 to costa.

Expanse 35 mm.

*Hab.* Poas, Volcano Turrialba.

*Sabulodes planaria*, sp. n.

♂. Palpi and frons violaceous brown. Vertex, body above, and wings brown. Fore wings: antemedial grey points on veins; a minute black discal point; outer line fine, dark reddish brown, from costa near apex to inner margin at two-thirds from base, followed by black points on veins, outwardly edged with white, and some whitish irrorations from vein 3 to inner margin; cilia reddish brown. Hind wings: a straight postmedial fuscous line outwardly shaded with fuscous and followed by points as on fore wings. Body below buff; legs outwardly fuscous grey. Wings below: from base to beyond middle yellowish buff, with fuscous irrorations; black discal points; a broad subterminal brown shade, not reaching inner margin; the apex of fore wings and outer margin narrowly, but broadly on hind wings, whitish; base of cilia whitish, with fuscous spots, terminally reddish brown.

Expanse 40 mm.

*Hab.* Juan Vinas.

*Sabulodes infida*, sp. n.

♂. Palpi buff, shaded with brown laterally. Body buff, the thorax tinged with brown, the abdomen irrorated with black. Fore wings buff, shaded and irrorated with brown; an antemedial brown shade, angled below costa, then inwardly oblique; a black discal point; a wavy postmedial brown line, inwardly oblique from costa, followed by a geminate grey-brown line from apex to inner margin, with fuscous points and whitish dashes on veins; a clearer buff shade on inner margin beyond geminate line and an irregular and indistinct subterminal buff shade. Hind wings similar, a fine medial line and black discal point; a geminate postmedial brown line and a subterminal buff shade. Underneath whitish buff; black discal points; a fine postmedial punctiform line; the outer margins thickly irrorated with brown and black, especially towards apex of fore wings.

Expanse 32 mm.

Female more of a whitish buff; antemedial line fuscous brown, with a projecting line on submedian fold to postmedial line; the postmedial more heavily marked than in the male, rust-brown; the buff shade beyond postmedial much broader and almost reaching apex. The hind wings have the buff and brown more contrasted than in the male.

Expanse 39 mm.

*Hab.* Juan Vinas, Tuis.

*Sabulodes nubifera*, sp. n.

♂. Palpi buff, laterally dark brown. Head buff; collar, thorax, and abdomen buff-brown, with a few black irrorations on patagia and abdomen. Fore wings: the base buff, with a few brown specks, limited by the antemedial, which consists of fuscous points on subcostal, median, and submedian; medial space brownish, shaded with buff on costa and crossed by a fuscous medial shade with a white point on discocellular; a postmedial row of black points on veins somewhat incurved, followed by a broad buff shade, expanding to outer margin below apex; the costa at apex and outer margin below vein 4 brownish. Hind wings buff, irrorated with black; a brownish medial shade; a postmedial straight row of black points; the outer margin broadly brown. Underneath roseate buff, thickly irrorated with brown; a faint medial shade; black discal points and postmedial black points. In some specimens the brown spaces and medial lines have a reddish tinge.

Expanse 47 mm.

*Hab.* Juan Vinas, Tuis.

*Sabulodes exsecrata*, sp. n.

♀. Body and wings brownish buff, with scattered black and brown irrorations; small black discal points; an outer row of black and reddish-brown points on veins, connected by a fine faint brownish shade; a subterminal pale reddish-brown shade; the termen shaded with light brown. Fore wings: an indistinct brownish antemedial shade, outangled in cell, outcurved below it; a faint reddish-brown shade beyond cell, incurved at vein 3; the outer line from costa at 4 mm. from apex, faintly outcurved from 5 to 3, then narrow to inner margin. Hind wings more heavily irrorated with black. Wings below whitish buff, thinly irrorated with black; black discal points. Fore wings: an outer row of black points, straight from costa to vein 3, then incurved, followed from 3 to costa by a broad reddish-brown shade; the apex whitish. Hind wings: the outer row of points slightly curved.

Expanse 35 mm.

*Hab.* Poas.

*Sabulodes? lineata*, sp. n.

♂. Antennæ serrate fasciculate. Palpi light brown; frons greyish; vertex and body brownish buff, a fuscous shade on neck, and some darker brown transverse shades on abdomen. Wings buff, shaded with pale rust-brown. Fore wings: costa lilacine fuscous, darkest on basal third; an antemedial line, black on costa, angled on subcostal, where there is a small cluster of black scales, then inbent, pale rust-brown and indistinct, preceded by a few black irrorations; a black point at end of cell; the postmedial pale rust-brown, curved below costa and oblique to before middle of inner margin, followed by a geminate sinuous dark line, indistinctly filled in with whitish and with white points on veins, terminating in a fuscous shade at apex; outer margin brown except a buff space on inner margin next to geminate line; a wavy dark brown subterminal line; the termen rather broadly fuscous; terminal black points; cilia brown. Hind wings: a fuscous shade at base; an antemedial rust-brown line; a black discal point; a postmedial rust-brown line, fuscous on costa, followed by a fine whitish-buff dentate shade, and then a greyish-brown line; a subterminal rust-brown line, also fuscous on costa; termen and cilia as on fore wings. Underneath whitish buff; discal and terminal black points. Fore wings: a black band along outer margin,

narrowing at apex, which is whitish. Hind wings: a narrower marginal black band not reaching termen.

Expanse 28 mm.

*Hab.* Juan Vinas.

*Periclina cervinoides*, sp. n.

♂. Palpi brown; body buff-brown. Wings buff, thickly striated with light brown. Fore wings: the costa yellowish buff; a fine and indistinct antemedial line, slightly angled on median, and marked by fuscous points on veins; the outer line fine dark brown, with darker points on veins, followed by white streaks and irrorations on veins, from costa before apex to inner margin beyond middle; cilia reddish brown; a fine dark streak on discocellular. Hind wings: a dark line across wing just beyond cell, faintly shaded outwardly with lilacine white. Underneath brownish buff; some black irrorations on outer margin; a fine fuscous line across both wings, followed on fore wings by black points from vein 4 to costa.

Expanse 35 mm.

*Hab.* Juan Vinas.

*Periclina cervina*, Warr., ♀, probably belongs to this species.

*Isochromodes sheila*, sp. n.

♂. Antennæ fasciculate. Palpi dark grey, fringed with whitish in front. Body and wings lilacine grey, thinly irrorated with fuscous except on thorax; abdomen with paired dorsal black spots. Fore wings: a finely dentate antemedial and postmedial line, grey-brown, very indistinct, marked by fuscous points on veins, the postmedial terminating below submedian in a black line; a minute black discal point; larger subterminal black points on veins, almost obsolete on vein 4; fuscous points on cilia at veins. Hind wings: very faint traces of medial and postmedial brownish lines, the latter punctiform on veins, outwardly pale shaded; subterminal black points on veins 2, 3, and discal fold; a black discal point. Underneath white, irrorated with fuscous brown except on inner margin of fore wings, the irrorations forming heavier subterminal shades; a crenulate terminal fuscous-brown line.

Expanse 31 mm.

Female: a wavy indistinct medial shade just beyond discal point, suffusing with postmedial at vein 2 and submedian; the lines without dark points; subterminal spots smaller; the discal spot on hind wings ochreous, edged with black.

Underneath the dark subterminal shades form distinct bands, on fore wings from costa well before apex to tornus, on hind wings from apex to anal angle ; no dorsal spots on abdomen.

Expanse 30–35 mm.

*Hab.* Juan Vinas, Sitio, Tuis.

*Isochromodes phyllira*, sp. n.

♂. Palpi white, streaked with black laterally. Frons white below, black above. Vertex and body ochreous buff; paired dorsal black spots on abdomen. Wings ochreous buff, irrorated with black ; black discal, postmedial, subterminal, and terminal spots. Fore wings : antemedial black spots on veins, connected by a fine brownish shade, these and the postmedial spots shaded with whitish ; a wavy light brownish line from costa, contiguous to cell-spot and meeting postmedial spots on inner margin ; a black point at base of submedian ; postmedial spots incurved below vein 3. Hind wings : the postmedial spot outset on veins 3 and 4. Underneath luteous, with only a few black irrorations, chiefly on costa and outer margins ; black discal points ; the terminal points larger. Fore wings : a dentate lunular fuscous line connecting the postmedial spots. Hind wings : a fuscous subterminal line, very irregular.

Expanse 34 mm.

*Hab.* Juan Vinas.

*Isochromodes chiron*, sp. n.

♂. Palpi fuscous grey, fringed with buff. Frons dark brown. Vertex and body buff-brown ; dorsal black irrorations and paired spots on abdomen ; underneath luteous ; tibiæ and tarsi streaked with fuscous grey. Wings buff-brown, irrorated with black ; outer, subterminal, and terminal black points on veins; black discal points. Fore wings : the costa streaked with fuscous grey ; a finely dentate brown antemedial line, punctiform on veins ; a fine brownish indistinct line from costa just beyond discal point, suffusing with outer row of spots at vein 2 ; the submedian outer spot suffusing with irrorations on inner margin. Wings underneath whitish buff, partly irrorated with fuscous striæ ; an outer fuscous line angled between veins 3 and 4, and followed from 3 to costa by fuscous shades, reaching termen on hind wings ; black discal points ; a terminal black line, crenulate on hind wings.

Expanse 33 mm.

*Hab.* Juan Vinas.

*Tetracis picturata*, sp. n.

♀. Palpi buff-brown, tipped with black. Body and wings buff-grey, thinly irrorated with black. Fore wings: the base faintly tinged with roseate, limited by the antemedial dark brown line, which is angled on subcostal, slightly inbent in cell, outangled on median and inangled on fold, then outcurved; a black discal point; postmedial reddish brown on costa at 4 mm. from apex, downcurved, angled at 7, then black and nearly straight to inner margin, followed by a rust-brown shade having its outer edge dentate crenulate; a black shade at apex; an oblique fuscous shade from vein 4 to termen below 2; cilia rust-brown; the margin produced at vein 4 beyond apex and slightly crenulate; a black discal point. Hind wings: a black postmedial line, followed by a rust-brown shade less distinct. Underneath whitish buff, with brownish striæ and black irrorations; the postmedial line very fine, dark brown and punctiform on veins.

Expanse 38 mm.

*Hab.* Juan Vinas.

*Azelina solitaria*, sp. n.

♀. Body and wings light reddish brown; a buff streak between antennæ. Fore wings: antemedial line fine, fuscous brown, inwardly faintly tinged with lilacine, oblique and outcurved to median, again outcurved to submedian, and less so on inner margin; a fuscous discal point; postmedial straight, slightly oblique, inwardly roseate buff from costa at three-fourths from base to inner margin beyond middle; outer margin tinged with lilacine, with oblique reddish-brown shades from near postmedial to termen; some terminal black and white spots; the margin deeply excised below apex and vein 6 and produced at vein 3 in a line with apex. Hind wings: a fine buff postmedial line faintly sinuous; the costa luteous. Underneath the postmedial line is white; black discal points; the inner margin of fore wings broadly whitish.

Expanse 45 mm.

*Hab.* Banana River, Sixola.

*Therina modica*, sp. n.

♂. Palpi ochreous brown. Head, thorax, abdomen, and wings ochreous brown; collar and patagia in front yellowish. Wings with indistinct darker striæ. Fore wings: a fine antemedial perpendicular brown line inwardly edged with

yellow ; the postmedial line similar but outwardly edged with yellow, slightly oblique inwardly from costa at 4 mm. from apex ; a dark shade on discocellular. Hind wings : a single medial line outwardly edged with yellow. Underneath brownish buff with a few darker striæ ; a black postmedial point on costa of fore wings.

Expanse 29 mm.

Female : the outer margins at vein 4 more distinctly angled than in the male ; body and wings darker and browner ; the lines heavier, yellow ; the veins finely yellowish.

Expanse 33 mm.

*Hab.* Juan Vinas, Sitio.

*Therina coalitaria*, sp. n.

♂. Palpi black ; head orange ; tegulæ black fringed with orange ; thorax fuscous grey ; abdomen whitish, tinged with yellow at base and crossed by fuscous-grey lines. Wings white spotted with dull olive-brown, partly coalescing. Fore wings : a dull olive-brown antemedial line angled in cell, coalescing with some of the spots ; a small black spot at end of cell ; an outer dark line faintly wavy, inwardly oblique from costa before apex, crossing a large dark blotch between 3 and 5, and followed by a large spot between 2 and submedian ; cilia with large black spots. Hind wings : a dark medial line ; traces of a curved postmedial line. Underneath similar.

Expanse 35 mm.

*Hab.* Poas, Juan Vinas.

*Œnoptila laudata*, sp. n.

♀. Palpi and frons dark reddish brown. Vertex, collar, and thorax dull greyish ; a black transverse shade on thorax. Abdomen above reddish brown shaded with black terminally, and with fine grey segmental lines. Fore wings pale olive-brown ; the costal margin broadly black shaded in front with buff, and reddish brown beyond middle ; a narrow dark maroon shade behind black margin from base to postmedial ; antemedial line perpendicular, wavy, fine, dark maroon inwardly edged with whitish from median, somewhat punctiform on median and submedian ; a postmedial broad black line, somewhat edged with maroon, straight and inwardly oblique, followed by a large white spot from vein 4 to near 7, irrorated with yellow, and outwardly cut by a maroon line ; a fine outcurved lunular line from this spot to inner margin ; the termen faintly tinged with red. Hind wings : costal

half strongly tinged with vermilion; inner half pale olive-brown; the postmedial line of fore wings continued to middle of inner margin, and followed by a fine maroon line, outwardly edged with buff, less heavily marked below vein 4, and outbent, deeply wavy. Underneath silky roseate buff; some black irrorations on costa of fore wings, and a small black apical spot.

Expanse 32 mm.

*Hab.* Juan Vinas.

*Thysanopyga submarginata*, sp. n.

♀. Body brown; a greyish spot on vertex; the abdomen shaded with dull grey on posterior half. Wings brown faintly tinged with lilacine, and thinly striated with black; the lines black-brown. Fore wings: the costa fuscous mottled with buff; a black subcostal line from base to apex; a very fine basal line; antemedial line straight or faintly oblique inwardly from subcostal; the postmedial line faintly incurved from subcostal to inner margin near base; a black point in cell; a subapical white lunule followed at termen by fuscous and brown shadings; a terminal dark line with whitish points at veins; cilia brown with a fine buff line at base. Hind wings: the antemedial line distinct, straight; a white discal point; the postmedial line very fine from costa near apex to anal angle. Underneath grey with fuscous-grey irrorations; the outer margins very broadly dark brown; a terminal white spot on fore wings from below vein 6 to vein 8; a black point at apex. The sexes similar.

Expanse 32 mm.

*Hab.* Juan Vinas, Sixola.

Allied to *T. subapicalis*, Dogn., which is larger and has no outer line on hind wings.

*Thysanopyga muricolor*, sp. n.

♂. Palpi and frons brown; vertex and body mouse-grey; lateral tufts at base of abdomen fuscous. Wings mouse-grey. Fore wings: the costa with black striæ; an antemedial reddish-brown line angled in cell, curved below median; the basal space in and below cell reddish brown; a fine medial line from subcostal above black discal point, inbent to median, then straight to inner margin, reddish buff, indistinctly edged with reddish brown; an outer reddish-brown incurved line, outwardly shaded with brown and some black at vein 2 and submedian fold; the terminal space

brownish grey; a subapical curved black line enclosing a light grey space above vein 6 and a brown dash on costa. Hind wings: a basal, postmedial, and subterminal fuscous shade; some fine black striæ on inner margin; a minute whitish discal point; a terminal brown line; cilia at base and terminally greyish. Underneath dull grey; black discal points; a few scattered black irrorations; a faint subterminal brownish shade on costa of fore wings and an apical black point.

Female: grey portion of wings rather lighter, the outer margin somewhat darker brown; the hind wings faintly tinged with brown.

Expanse 29 mm.

*Hab.* Juan Vinas.

*Thysanopyga fuscaria*, sp. n.

♂. Palpi and frons brown; vertex grey; head behind buff-brown, collar and thorax violaceous brown, the patagia greyish; abdomen brown grey. Fore wings: costal margin, a spot below apex on outer margin, and a marginal space from vein 5 to tornus whitish buff with dark grey striæ, otherwise fuscous grey; antemedial line reddish brown, fine, angled on subcostal, inbent on median, and then straight to submedian, inwardly edged with whitish buff; a black medial line from subcostal to inner margin; a white discal point; the outer line reddish brown, incurved, outwardly shaded with whitish buff from below vein 5. Hind wings buff, shaded with ochreous, and with long dark grey striæ; an indistinct fuscous-brown antemedial line; a white discal point followed by a broad fuscous shade; an indistinct subterminal shade, very irregular. Underneath grey thickly irrorated with fuscous.

Expanse 27 mm.

*Hab.* Sitio, Juan Vinas.

Closely allied to *T. muricolor*, Schs.

*Petelia vinasaria*, sp. n.

♂. Palpi and legs lilacine buff. Head and thorax purplish brown; abdomen greyish shaded dorsally with violaceous red. Wings purplish brown striated with fuscous; black discal points; a fine fuscous antemedial line; the outer line fine, fuscous, faintly lunular. Underneath pale buff, the outer margins broadly shaded with purplish red; black discal points.

Expanse 24 mm.

Female : a faint reddish-brown shade on fore wings beyond cell, and a similar shade on hind wings between the lines.

Expanse 28 mm.

*Hab.* Juan Vinas.

*Petelia pallidula*, sp. n.

♂. Palpi and frons purplish brown. Vertex and body pale reddish brown. Wings light brown : an outer row of whitish points on veins, inwardly dark shaded. Fore wings : antemedial whitish points on veins ; a reddish shade at end of cell and beyond it ; a small similar shade below vein 2 medially, followed by a purplish shade which extends to costal and inner margins ; a black discal point ; some darker striæ on margins. Hind wings : the cell crossed by purplish striæ ; a small reddish shade beyond cell between 4 and 6. Fore wings below roseate buff ; a black streak on discocellular ; some dark striæ on costa. Hind wings below yellowish ; the outer margin broadly roseate.

Expanse 30 mm.

Female : wings yellowish brown ; the outer row of spots larger, black, those on veins 3 and 4 somewhat outset. Fore wings : antemedial spots faintly connected by a fuscous line ; the purplish shade across end of cell very faint ; the shades beyond cell pale ochreous. Wings below roseate ; a faint darker subterminal shade.

Expanse 32 mm.

*Hab.* Poas.

Allied to *P. interrupta*, Warr.

*Petelia nigrivestita*, sp. n.

♂. Palpi light brown tipped with grey. Frons purplish brown. Body light brown ; a large black patch on thorax posteriorly extending on abdomen ; transverse black bands on most of the segments. Wings light brown with a few darker striæ and black irrorations. Fore wings : an interrupted faint purplish antemedial line ; a large fuscous patch at and beyond end of cell, not reaching outer margin, its outer edge dentate and followed by a black spot at apex, and a fuscous shade between 3 and 4 ; some outer white points on veins 3–7 ; a purplish postmedial shade from vein 3 to inner margin, preceded below vein 2 by a faint pale reddish shade. Hind wings : a faint postmedial line, heavily marked, black, from vein 4 to inner margin and followed by a large black patch, with its outer edge dentate. Underneath roseate buff with minute black discal points.

Expanse 28 mm.

Female: brighter tinged with salmon-colour; the black striæ conspicuous; the large spots black, very distinct. Fore wings: antemedial line angled below costa, inbent and interrupted between the veins; no terminal fuscous shade at vein 4.

Expanse 34 mm.

*Hab.* Poas, Juan Vinas.

Closely allied to *P. nigriplaga*, Schs., but of a different colour and the large patches more remote from margin.

*Petelia umbrosa*, Schs.

♀. Palpi, head, and collar purplish. Thorax and abdomen reddish. Wings reddish thickly striated with purplish. Fore wings: costa purplish; broad antemedial, medial, and postmedial purplish shades, the last two faintly oblique outwardly and angled at vein 3. Hind wings; an antemedial and a postmedial broad purplish shade, suffusing vaguely above vein 6 and below vein 4. Underneath yellowish buff; black discal points; a fine fuscous outer line, angled on both wings at vein 4; some faint purplish striæ.

Expanse 28 mm.

*Hab.* Juan Vinas.

*Petelia cariblanca*, sp. n.

♂. Palpi pale reddish brown. Head, body above, and wings purplish red; a black spot on frons; neck whitish buff, similar segmental lines on abdomen. Wings: black discal points followed by a nearly quadrate yellow spot edged with brighter red; an outer row of whitish points on veins. Fore wings: antemedial white points on veins; a small medial yellow spot on fold edged with red, and a faint similar spot in cell before discal spot. Fore wings below pale reddish; a black discal spot and traces of a yellow spot. Hind wings below pale yellowish; a reddish discal spot; the outer margin broadly reddish.

Expanse 34 mm.

*Hab.* Cariblanco.

*Œnothalia montivaga*, sp. n.

♀. Palpi and frons brown, the vertex darker; collar fuscous grey; thorax and abdomen reddish brown. Wings rich brown. Fore wings: the costal margin purplish fuscous; a purplish-brown antemedial line straight from subcostal to

inner margin; a similar medial shade faintly outcurved, crossing the black discal point; an outer series of white points, the largest on costa connected by a faint darker brown line partly irrorated with white, and outcurved on veins 3 and 4; terminal white points on veins. Hind wings: an antemedial purplish-brown line, straight from costa to below cell, then inbent to inner margin; an outer row of white points also outcurved on 3 and 4, and terminal points as on fore wings. Fore wings below roseate brown; a dark outer line angled below vein 4; a small discal point. Hind wings below yellowish irrorated with purple on outer margin; a large discal point; an outer violaceous line, broader than on fore wings, and angled below vein 4.

Expanse 31 mm.

*Hab.* Poas.

Allied to *Œnothalia anagogaria*, Warr.

*Alana picturata*, sp. n.

♂. Palpi and frons brown; antennæ and vertex grey; back of head and collar lilacine brown; thorax grey; abdomen grey shaded with brown dorsally. Fore wings grey, thinly striated with fuscous; a heavy reddish-brown antemedial line, angled below subcostal; a faint medial brownish shade, followed by a triangular reddish-brown spot, its apex extending on vein 5; a buff shade follows this spot towards apex and is crossed by a reddish-brown postmedial line, only faintly visible below vein 5; a subterminal black line from vein 5 to costa, preceded by a reddish-brown shade; a faint terminal dark line. Hind wings light reddish brown tinged with grey at base and with a few greyish striæ; a dark brown antemedial line, an ochreous discal point, a reddish-brown medial line, and a faint subterminal line. Underneath whitish grey; a broad marginal fuscous shade. The sexes similar.

Expanse 24 mm.

*Hab.* Sixola, Esperanza.

*Melanolophia conspicua*, sp. n.

♂. Palpi buff shaded with brown laterally; vertex whitish buff; thorax, abdomen, and wings buff faintly tinged with green; abdomen with brownish dorsal spots and transverse shades. Fore wings: the margins with fuscous striæ; a fine dark antemedial line followed by a dark point on median vein; a broad fuscous medial line, somewhat sinuous and inbent; the postmedial fuscous, finely lunular, forming

a single larger lunule between vein 2 and submedian ; a heavy fuscous shade on vein 4 from postmedial to subterminal ; the subterminal consisting of coalescing black spots, somewhat interrupted between 2 and 4 ; a marginal black spot above vein 5 sometimes coalescing with subterminal ; an interrupted terminal black line. Hind wings : the medial black shade heavily marked ; the postmedial line very fine, irregular ; subterminal black spots chiefly near inner margin and between 4 and 6 ; a terminal wavy black line, punctiform near anal angle. Underneath whitish buff, the lines indistinct ; black discal points ; a broad subterminal fuscous shade reaching termen between 4 and 7 on fore wings, narrowing and interrupted near anal angle on hind wings.

Expanse 35 mm.

*Hab.* Juan Vinas, Tuis.

*Melanolophia directilinea*, sp. n.

♂. Palpi and frons dark brown ; vertex yellow. Legs buff, tarsi brown-grey. Thorax and abdomen grey. Wings buff-grey irrorated with brown ; the lines dark brown. Fore wings : antemedial line curved on costa, then slightly oblique inwardly ; median line straight, followed by a dark point on discocellular ; postmedial line straight, faintly oblique ; traces of subterminal dark shades between veins 5 and 7, more noticeable in the female. Hind wings : antemedial and postmedial lines straight from costa to inner margin ; the ground-colour a trifle paler before postmedial ; a terminal fine dark line on both wings. Underneath paler, the lines less distinct ; a fuscous subterminal shade on female.

Expanse 41 mm.

*Hab.* Juan Vinas, Tuis, Carillo.

Close to *M. ordinata*, Dogn.

*Cidariophanes luculenta*, sp. n.

♂. Palpi mottled lilacine brown and buff, spotted with fuscous. Head and collar green, the frons spotted with black, and black shadings on collar outwardly. Thorax mottled black, brown, and green. Abdomen fuscous brown above with brighter brown dorsal tufts. Legs roseate brown spotted with black. Fore wings : basal half dark brown crossed by black striæ and a wavy black medial line ; an antemedial pale green fascia, finely edged with black, outwardly oblique from costa, and angled on fold, its inner edge

expanding basally on subcostal; costa with roseate brown striæ; a green spot above discocellular inwardly, and some green before a large fuscous subterminal spot; postmedial space roseate buff crossed by black striæ, and a black spot on discocellular, followed by a green shade between 2 and 4; broad marginal fuscous shadings crossed by black striæ, somewhat interrupted on vein 4; the termen green, with large black spots between the veins; an upright subterminal whitish streak near the tornus. Hind wings fuscous; a large orange apical space to middle of outer margin; the inner area crossed by a postmedial and subterminal black wavy line; the termen on anal half narrowly roseate buff. Fore wings below: the basal and apical area roseate buff, with dark irrorations; an oblique medial black fascia, followed by a broad yellow space to tornus; a broad oblique black space from beyond cell to outer margin at vein 2. Hind wings reddish buff irrorated with black.

Expanse 45 mm.

Female: fore wings lilacine brown, with darker striæ and black irrorations; the medial black line outangled in posterior portion of cell, inwardly angled on fold; a fine black postmedial line, oblique, wavy, strongly angled on vein 4, followed by a dull greenish shade; markings otherwise similar to male, but paler. Hind wings also with a medial black line and with the lines partly repeated on underside.

Expanse 48 mm.

*Hab.* Juan Vinas, Cartago.

*Bombycodes circumdata*, sp. n.

♂. Palpi, head, collar, and coxæ yellow. Thorax and abdomen above silky grey, underneath whitish; legs outwardly dark grey. Wings white, the veins more heavily scaled; all the margins broadly dark grey.

Expanse 40 mm.

The female has vein 7 on hind wings distinctly dark grey.

Expanse 49 mm.

*Hab.* Juan Vinas, Tuis.

Allied to *B. orates*, Dr.

*Genussa vicina*, sp. n.

♂. Head fuscous; palpi fringed with orange. Collar white shaded with dark grey. Thorax white medially, dark grey laterally; the patagia almost entirely dark grey. Abdomen dark grey, whitish dorsally on basal half; a lateral

white line; white underneath. Wings white; the margins fuscous grey, darkest on veins. Fore wings: a rather broad fuscous-grey band from costa across discocellular to tornus; veins fuscous grey except on large postmedial white area. Hind wings white suffused with fuscous brown between veins 2 and 4, though streaked with white near outer margin; the veins fuscous grey.

Expanse 39 mm.

*Hab.* Sixola, Juan Vinas.

Near *G. semiplecta*, Warr., but the transverse band on fore wings differently placed.

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## LXVII.—*Notes on Fossorial Hymenoptera.*—V.

By Rowland E. Turner, F.Z.S., F.E.S.

### *Further Notes on the* Thynnidæ *and* Scoliidæ.

Where not otherwise mentioned, the types of the species described here are in the British Museum, several having been received from the African Entomological Research Commission. In more than one case I have been obliged to speak rather severely of the work of Mr. Cameron; I regret to do so, but as he is still publishing I consider it necessary. But in describing species of *Scolia*, especially *Dielis*, from the male sex he is by no means alone: this should never be attempted except from a large series and by comparison of the genitalia, which usually show good specific distinctions; colour is not usually reliable, and even when constant locally may be different in another locality without corresponding differences in the female. Descriptions of new species in this genus when taken from the male alone are seldom anything but a hindrance to other workers. Cameron, in speaking of the African species of *Plesia* in Sjöstedt's 'Zool. Kilimandjaro-Meru Expedition,' states that they are much in need of revision. He is quite right, but it is largely his own work on the group that renders such a revision difficult or almost impossible for other workers.

#### Family Thynnidæ.

#### Subfamily *Rhagigasterinæ.*

*Rhagigaster latisulcatus*, sp. n.

♀. Nigra, nitida, sparse punctata; capite subquadrato, sulco lato,

obliquo, auricomato utrinque; pygidio lato, haud compresso; flagello fusco.

♂. Niger, albido-pilosus, punctatus, alis flavo-hyalinis, tarsis brunneis.

Long., ♀ 17 mm., ♂ 19 mm.

♀. Head subquadrate, a little broader than long; the clypeus short, shallowly emarginate and with a median carina; front above the base of the antennæ closely punctured; the vertex shining, with a few scattered punctures; a deep broad groove on each side running obliquely from the eye almost to the posterior margin of the head and densely clothed with long golden hairs. Pronotum sparsely punctured, more closely on the anterior portion, where some of the punctures are confluent longitudinally; as long as the breadth on the anterior margin, distinctly broadened posteriorly. Scutellum, median segment, and abdomen very sparsely punctured; scutellum twice as broad as long, slightly narrowed posteriorly; median segment as long as the pronotum, gradually broadened from the base, vertically truncate posteriorly; first abdominal segment truncate at the base, a little broadened to the apex, and slightly longer than the second segment.

♂. Clypeus emarginate at the apex, with a narrow cordate space reaching from the base to the apex smooth and flattened and shining, margined by raised carinæ, the sides of the clypeus densely clothed with long whitish pubescence. Head, thorax, and median segment closely but not coarsely punctured; the interantennal prominence well developed and broadly rounded at the apex; a transverse carina below the anterior ocellus not nearly reaching the eyes. Antennæ inserted a little further from each other than from the eyes. Anterior angles of the pronotum not prominent, the anterior margin straight and slightly raised. Mesonotum with the usual four longitudinal furrows, the inner pair very broad and deep; scutellum more sparsely punctured, triangular; median segment short and broad, rounded. Abdomen a little longer than the head, thorax, and median segment combined, not slender, rather sparsely punctured, the segments strongly constricted at the base, the apical segment small, triangular, with a median carina; hypopygium without lateral spines. Third abscissa of the radius longer than the second by nearly one half; second recurrent nervure received close to the base of the third cubital cell, almost interstitial with the second transverse cubital nervure, strongly bent outwards in the middle.

*Hab.* Kuranda, Queensland (*F. P. Dodd*).

*Eirone marginicollis,* sp. n.

♂. Niger; mandibulis, clypeo, scapo, pronoto, tegulis, mesonoto macula quadrata, scutello, postscutello, segmentoque mediano postice flavis; abdomine segmentis 4 basalibus rufo-testaceis; pedibus testaceis, flavo-variegatis; alis hyalinis, iridescentibus, nervulis fuscis.

♀. Rufo-castanea; capite latitudine sesqui longiore; abdomine nitido, cylindrico.

Long., ♂ 7 mm., ♀ 4 mm.

♂. Clypeus convex, subcarinate from the base almost to the apex, slightly produced and truncate at the apex. Antennæ inserted further from each other than from the eyes, without a frontal prominence between them. Head and thorax finely and closely punctured, more coarsely on the head than on the thorax; pronotum smooth and shining, with the anterior margin straight and very strongly raised, the propleuræ strongly concave. Scutellum subtruncate or very broadly rounded at the apex; median segment short and broad, obliquely sloped posteriorly. Abdomen shining and almost smooth, fusiform; the hypopygium broadly rounded. Third abscissa of the radius longer than the second; first recurrent nervure received at the middle of the second cubital cell, second at about one-third from the base of the third cubital cell.

♀. The whole insect shining, very sparsely and finely punctured. Head rectangular, about half as long again as broad, very slightly convex; the eyes very small, not quite touching the base of the mandibles. Pronotum a little shorter than the median segment, slightly narrowed anteriorly, about half as long again as the greatest breadth, narrower than the head. Scutellum small, rectangular, a little longer than broad. Median segment a little broadened from the base, nearly twice as long as the greatest breadth. Abdomen slender, cylindrical; pygidium simple. Intermediate coxæ very narrowly separated.

*Hab.* Port Darwin (*F. P. Dodd*); March.

## Subfamily *Thynninæ.*

Mons. J. Bréthes (An. Mus. Nac. Buenos Aires, xx. pp. 205–316, 1910) has recently published a paper in which he deals with many species of Thynnidæ and Scoliidæ from Argentina and the adjacent countries. He has unfortunately overlooked one or two of my papers published two years previously, and, through no fault of his own, was unac-

quainted with more important papers published earlier in 1910. As a result several of his names must sink as synonyms. He places all the American Thynnidæ in the genus *Elaphroptera*, considering that the material available is insufficient for division into small genera. This division has already been attempted, and as the genera founded by Guérin were based on careful dissections and are confirmed by differences in the more recently discovered females, I think they should have been allowed to stand. But M. Bréthes makes no attempt to group the species according to their natural affinities, and only once makes a note of comparison ; his key to the males is based almost entirely on colour, and the descriptions are arranged somewhat after the order in which the species fall in the key to the males. Now the utter unreliability of colour-characters in this family has been shown by M. André in his valuable paper on the Thynnidæ of Concepcion, which is not referred to by M. Bréthes. The descriptions are fortunately fairly complete, except where neuration is of importance, though there is much difficulty in giving a correct idea of the shape of the male clypeus in few words and without the help of plates.

The following synonymy may, I think, be regarded as certain; probably more will be added later.

### *Scotæna polistoides*, Turn.

*Scotæna polistoides*, Turn. Zool. Jahrb. xxix. 2, p. 182 (1910).
*Elaphroptera diodon*, Bréthes, An. Mus. Nac. Buenos Aires, xx. p. 221 (1910).

### *Spilothynnus bituberculatus*, Turn.

*Telephoromyia bituberculata*, Turn. Trans. Ent. Soc. London, p. 70 (1908). ♀.
*Spilothynnus bituberculata*, Turn. Ann. & Mag. Nat. Hist. (8) iii. p. 132 (1909). ♂.
*Elaphroptera mendozana*, Bréthes, An. Mus. Nac. Buenos Aires, xx. p. 237 (1910). ♂ ♀.

### *Spilothynnus* (?) *stygius*, Turn.

*Spilothynnus stygius*, Turn. Zool. Jahrb. xxix. 2, p. 190 (1910). ♂.
*Elaphroptera melanosoma*, Bréthes, An. Mus. Nac. Buenos Aires, xx. p. 235 (1910). ♂ ♀.

### *Ammodromus ingenuus*, Sm.

*Thynnus ingenuus*, Sm. Descr. n. sp. Hymen. p. 173 (1879) (nec Bréthes).
*Elaphroptera fasciatella*, Bréthes, An. Mus. Nac. Buenos Aires, xx. p. 232 (1910).

*Eucyrtothynnus avidus*, Turn.

*Elaphroptera avida*, Turn. Trans. Ent. Soc. London, p. 73 (1908). ♂.
*Elaphroptera avida*, Turn. Zool. Jahrb. xxix. 2, p. 201 (1910). ♀.
*Eucyrtothynnus avidus*, Turn., Wytsman, Gen. Insect. cv. p. 25 (1910).
*Elaphroptera bruchii*, Bréthes, An. Mus. Nac. Buenos Aires, xx. p. 222 (1910). ♂ ♀.

*Eucyrtothynnus anisitsi*, Turn.

*Elaphroptera anisitsi*, Turn. Zool. Jahrb. xxix. 2, p. 204 (1910). ♂ ♀.
*Elaphroptera paraguayensis*, Bréthes, An. Mus. Nac. Buenos Aires, xx. p. 240 (1910). ♀.
? *Elaphroptera paranensis*, Bréthes, An. Mus. Nac. Buenos Aires, xx. p. 237 (1910). ♂.

*Eucyrtothynnus* (?) *inferna*, Turn.

*Elaphroptera inferna*, Turn. Zool. Jahrb. xxix. 2, p. 214 (1910). ♂.
*Elaphroptera tucumana*, Bréthes, An. Mus. Nac. Buenos Aires, xx. p. 234 (1910). ♂ ♀.

The generic position of this species is doubtful, but it is nearer to *Eucyrtothynnus* than to *Elaphroptera*. It is allied to *E. mapirensis*, Turn.

*Telephoromyia argentina*, Weyenb.

*Tachypterus argentinus*, Weyenbergh, Berl. ent. Zeitschr. xxvii. p. 277 (1883).

Mons. Bréthes (An. Mus. Nac. Buenos Aires, xx. p. 229, 1910) sinks this species and *T. cordoviensis*, Weyenb., with some doubt as synonyms of *T. rufipes*, Guér. Weyenbergh evidently used the generic name *Tachypterus* because the mandibles are tridentate and both recurrent nervures received by the second cubital cell, whereas Guérin plainly states that in *T. rufipes* the second recurrent nervure is received by the third cubital cell. The name *Tachypterus* is correct, and Mons. Bréthes has been misled by a mistake in Dalla Torre's catalogue in correcting it to *Trachypterus*, which is quite a different genus, not belonging to the Thynnidæ. Whether his identification of Guérin's species is correct or not I cannot say, as he gives no description of the male. He does not mention the neuration in any of his descriptions of Thynnidæ or Scoliidæ.

*Eucyrtothynnus rubescens*, Bréthes, subsp. *fiebrigi*, nov.

♂. Niger; mandibulis (apice excepto), clypeo, maculis duabus supra antennas, margine interiore oculorum latissime antice, genis,

margine posteriore capitis anguste, pronoto antice et postice in medio interrupto, mesopleuris macula arcuata, tegulis, mesonoto linea utrinque supra tegulas et macula bilobata postice, scutello margine posteriore, angulis anticis et maculis duabus magnis medianis, postscutello, segmento mediano fasciis duabus obliquis apice divergentibus, segmentis dorsalibus 1–6 macula magna laterali femoribusque infra flavis; abdomine cerasino, segmento primo basi nigro; tibiis tarsisque ferrugineis, flavo-variegatis; alis subhyalinis; clypeo dimidio apicali concavo, apice late emarginato, angulis productis, acutis; hypopygio angusto, apice rotundato.

♀. Nigra; fronte, segmento dorsali primo fascia lata transversa, secundo macula transversa utrinque, tertio, quarto quintoque fascia lata transversa in medio interrupta flavis; mandibulis, clypeo, antennis, pygidio pedibusque brunneo-ferrugineis; clypeo subconcavo, emarginato, segmento dorsali secundo inter carinas 2 transverse rugoso, margine apicali insuper elevato, segmento sexto dorsali angusto, ventrali semicirculari apice rotundato.

Long., ♂ 18 mm., ♀ 14 mm.

♂. Closely and finely punctured, the concave portion of the clypeus smooth and shining, seventh dorsal segment longitudinally rugose. Antennæ about as long as the thorax and median segment combined, the apical joints arcuate beneath, scutellum convex; abdomen rather slender; third abscissa of the radius nearly twice as long as the second, third cubital cell receiving the second recurrent nervure at about one-fifth from the base; inner tooth of the mandibles obliquely truncate.

♀. Head finely and closely, thorax more sparsely punctured, abdomen almost smooth, the second dorsal segment transversely rugose in the middle between two transverse carinæ, the apical margin strongly raised; pronotum produced in the middle of the anterior margin into a rounded lobe, half as broad again on the anterior as on the posterior margin, slightly depressed in the middle. Abdomen beneath closely punctured; fifth ventral segment coarsely obliquely striated; sixth dorsal segment very narrow, pointed at the apex, and fitting into an incision in the broadly rounded lower plate of the pygidium.

*Hab.* San Bernardino, Paraguay (*K. Fiebrig*).

Type in U.S. National Museum.

I do not think that this is more than a geographical race of *Elaphroptera rubescens*, Bréthes (An. Mus. Nac. Buenos Aires, xx. p. 239, 1910), but in the description of that species there is no mention of the clypeus being emarginate, and the yellow markings on the scutellum and abdomen differ.

The male only of *rubescens* is described. The markings on four specimens of the present species which are before me do not vary appreciably; but colour in this genus is often unreliable.

*Elaphroptera intaminata*, Sm.

*Thynnus intaminatus*, Sm. Descr. n. sp. Hym. p. 173 (1879). ♂.
*Thynnus* (*Elaphroptera*) *holomelas*, André, Voy. Belgica, Zool. Hym. p. 61 (1902). ♂.
*Elaphroptera arcuata*, Turn. Trans. Ent. Soc. London, p. 76 (1908). ♂.

*E. arcuata* is merely a variety with clear hyaline wings; the wings in the type of *intaminata* are unusually dark; it is probably from a more northern locality. The first abdominal segment seems to be distinctly longer and more slender in the Patagonian form of the species than in the Chilian specimens, but they do not differ otherwise except in the length of the third abscissa of the radius, which is shorter in the Chilian form. I do not think they can be treated as distinct species; but if they are, then André's name should stand for the Patagonian form.

Genus Eurohweria, nom. nov.

*Æolothynnus*, Turn. Proc. Linn. Soc. N.S.W. xxxiii. p. 113 (1908) (partim).
*Æolothynnus*, Turn., Wytsman's Genera Insect. cv. p. 39 (1910) (nec Ashmead).
*Turnerella*, Rohwer, Entomological News, xxi. p. 349 (1910).

My identification of Ashmead's genus, of which the type was undescribed, was incorrect, as has been pointed out by Mr. Rohwer, who renamed the genus *Turnerella*. That name, however, was used by Professor Cockerell for a genus of bees; his paper was published in London on the same day as Mr. Rohwer's paper was published in America, and I believe the name should be retained for the bee. I therefore have to propose a new name for the genus.

*Eurohweria pentadonta*, sp. n.

♂. Niger; punctatus, abdomine nitido; mandibulis basi, clypeo macula apicali lineaque longitudinali basali nigris, margine exteriore oculorum, macula magna bilobata inter antennas, pronoto angulis anterioribus et margine posteriore, mesonoto macula, mesopleuris maculis duabus, scutello macula bilobata, tegulis, postscutello, segmento mediano fascia curvata utrinque, segmentisque dorsalibus 1–6 macula obliqua utrinque pallide flavis; pedibus testaceis; alis hyalinis, nervulis fuscis; clypeo convexo,

modice producto, apice truncato; pronoto antice subemarginato; hypopygio quinquedentato.

♀. Testaceo-brunnea; capite ferrugineo, longitudine sesqui latiore, haud compresso, in medio longitudinaliter sulcato, albo-piloso; pronoto longitudine latiore, dense albo-piloso; segmento mediano obliquo, nitido; abdomine nitido; segmento dorsali secundo transverse tricarinato, margine posteriore insuper elevato; pygidio elongato, angusto.

Long., ♂ 7–9 mm., ♀ 4–5 mm.

♂. Antennæ inserted further from each other than from the eyes, a little shorter than the thorax without the median segment, the interantennal prominence not developed. Clypeus moderately produced, strongly convex, truncate at the apex, the labrum exposed. Head and thorax closely but not coarsely punctured; abdomen shining and almost smooth, the segments constricted at the base. Pronotum widely and very shallowly emarginate; median segment rounded; scutellum broadly truncate at the apex, almost flat; sixth ventral segment with a spine on each side at the apical angles; hypopygium truncate at the apex, with the usual three spines, the apical spine the longest, but all rather short, a lateral spine on each side a little before the apex.

♀. The first, third, and fourth dorsal segments are depressed broadly at the apex and sides, the raised basal portion is very strongly bilobed and rounded on each side. Median segment obliquely sloped from the scutellum. The pronotum is very densely clothed with whitish hairs, so as to hide the sculpture; the head is much less thickly pubescent, the hairs being confined to the front round the base of the antennæ and to the median line; the eyes are separated from the base of the mandibles by a distance exceeding their own breadth. Ventral surface of the abdomen punctured, most strongly on the fourth and fifth segments.

*Hab.* Kuranda, Queensland (*F. P. Dodd*).

### *Eurohweria myola*, sp. n.

♂. Niger, nitidus, sparse et delicatissime punctatus; clypeo convexo, haud elongato, apice anguste truncato; hypopygio tridentato; mandibulis, clypeo, marginibus oculorum, fronte macula magna utrinque, vertice macula, capite margine posteriore anguste, pronoto macula nigra utrinque, mesonoto macula maxima quadrata, tegulis, scutello basi nigro, postscutello, mesopleuris fascia curvata, segmento mediano apice et lateribus, segmentisque dorsalibus 1–6 macula obliqua utrinque læte flavis; pedibus flavis, testaceo-variegatis; alis hyalinis, iridescentibus, nervulis pallide testaceis.

♀. Testacea; thorace fusco-brunneo; capite fusco, haud compresso, latitudine paullo longiore, subconvexo, nitido; pronoto longitudine sesqui latiore; segmento dorsali secundo transverse tricarinato, margine apicali insuper paullo elevato; pygidio elongato, angusto.

Long., ♂ 7 mm., ♀ 4 mm.

♂. Clypeus strongly convex, not elongate, narrowly truncate at the apex, much broader than long, produced into a point on each side above the base of the mandibles. Antennæ shorter than the thorax without the median segment, inserted further from each other than from the eyes, without an interantennal prominence; the front marked with a shallow longitudinal sulcus. Anterior margin of the pronotum strongly raised and transverse; scutellum rather narrowly truncate at the apex, only slightly convex; median segment rounded; abdomen slender, the sides almost parallel except at the extremities; the segments constricted at the base; sixth ventral segment with a short spine on each side at the apical angles; hypopygium not broad, ending in three spines, the middle spine more than twice as long as the lateral. Very sparsely and rather finely punctured, the abdomen almost entirely smooth. Third abscissa of the radius longer than the second; the second recurrent nervure received at about one-sixth from the base of the third cubital cell.

♀. Smooth and shining, with a few small punctures on the abdomen. Head subrectangular, rounded at the posterior angles, a little longer than broad, a lateral carina reaching from the eye nearly halfway to the posterior margin of the head, the sides of the head concave. Pronotum slightly narrowed posteriorly, half as broad again as long; scutellum transverse, not very narrow, more than twice as broad as long, equal in length to the dorsal surface of the median segment. First dorsal segment broadly depressed at the apex; second with three transverse carinæ in addition to the raised apical margin, the basal carina sometimes concealed by the first segment; third and fourth segments broadly depressed on the apical margin, the raised portion before the depression deeply emarginate in the middle and rounded at the sides. Pygidium long and narrow, almost linear.

*Hab.* Kuranda, Queensland (*F. P. Dodd*).

This is very near *perelegans*, Sm., which is probably distinct from *cerceroides*, but which is at present only known in the male sex. The punctures on the thorax in *perelegans* are very large and deep.

*Eurohweria compressiceps,* sp. n.

♀. Testaceo-brunnea; capite nigro, elongato-arcuato, lateraliter compresso, latitudine duplo longiore; pronoto longitudine paullo latiore; segmento dorsali secundo transverse bicarinato; pygidio elongato, angusto.

♂. Niger; mandibulis basi, clypeo macula basali utrinque, pronoto margine anteriore interrupto et margine posteriore, mesopleuris linea antice, postscutello, segmentisque dorsalibus 2–4 macula utrinque albidis; abdomine rufo-ferrugineo; alis subhyalinis; clypeo elongato, carinato, apice emarginato; antennis brevissimis; pronoto antice emarginato; hypopygio trispinoso.

Long., ♀ 4 mm., ♂ 6 mm.

♀. Head shining, very strongly compressed laterally, arched, twice as long as broad, smooth and shining; eyes very small, touching the base of the mandibles. Thorax and median segment finely but not closely punctured; pronotum a little broader than long, subrectangular, as long as the scutellum and median segment combined, and as broad as the head. Abdomen almost smooth; the segments rather narrowly depressed on the apical margin, more broadly in the middle than at the sides; second dorsal segment with two strong transverse carinæ, the apical margin less strongly raised, forming a third. Pygidium long and very narrow. Intermediate and posterior tarsi slender.

♂. Clypeus long, as long as the greatest breadth, shallowly emarginate at the apex, with a median longitudinal carina, the labrum exposed. Head, thorax, and median segment finely and closely punctured; antennæ no longer than the thorax without the median segment, of even thickness throughout, as far from the eyes as from each other, the interantennal carina almost transverse and not very prominent. Pronotum as broad as the head, widely emarginate anteriorly; a very deep hollow in front of the mesopleuræ for the reception of the anterior femora. Scutellum convex, subtriangular, rounded at the apex, with a deep transverse groove at the base, rather sparsely punctured. Median segment rounded, not truncate. Abdomen scarcely longer than the head, thorax, and median segment combined, tapering slightly towards the extremities, especially towards the apex; the segments strongly constricted at the base. Hypopygium with three spines, the median spine the longest. Third abscissa of the radius longer than the second; the second recurrent nervure received at about one-sixth from the base of the third cubital cell. The spine at the angles of the sixth ventral segment is short, but quite distinct.

*Hab.* Kuranda, Queensland (*F. P. Dodd*).

Allied to *sanguinolentus*, Turn., especially in the strongly compressed head of the female.

*Eurohweria immitis*, sp. n.

♂. Niger; clypeo basi, pronoto antice et postice, mesopleuris antice, postscutello, segmentis dorsalibus 1–5 macula laterali obliqua utrinque, tibiis subtus tarsisque anterioribus albis; segmentis abdominalibus 5–7 rufo-ferrugineis; alis hyalinis, subiridescentibus, nervulis nigris; clypeo convexo, elongato, latitudine æquilongo, apice anguste truncato; pronoto haud emarginato; hypopygio tridentato.

♀. Nigra; abdomine pedibusque testaceis; capite modice compresso, latitudine longiore, antice paullo dilatato; segmento secundo dorsali transverse tricarinato, margine posteriore insuper elevato; pygidio elongato, angusto.

Long., ♂ 7 mm., ♀ 4 mm.

♂. Clypeus convex, as long as broad, produced and narrowly truncate at the apex; the labrum slightly exposed. Antennæ about as long as the thorax without the median segment; the interantennal carina low and almost transverse. Head closely punctured on the front, more sparsely on the vertex; thorax rather sparsely and finely punctured; base of the median segment and the whole dorsal surface of the abdomen smooth and shining, the ventral surface of the abdomen sparsely punctured. Pronotum nearly half as long in the middle as the mesonotum, the anterior margin almost transverse; scutellum depressed at the base, not very strongly convex, broadly truncate at the apex. Median segment rounded. A strong depression in front of the mesopleuræ for the reception of the anterior femora. Abdominal segments strongly constricted at the base; the abdomen slender, sixth ventral segment with a spine on each side at the apical angles; hypopygium ending in three spines, the middle spine the longest.

♀. Head flattened above, longer than broad, slightly widened anteriorly, moderately compressed, the sides flattened, smooth and shining. Thorax sparsely punctured; pronotum as long as broad, the anterior angles prominent. Apical margin of the first dorsal segment strongly depressed, second segment with four strong transverse carinæ including the raised apical margin; pygidium long and very narrow; abdomen almost smooth, with a few large punctures.

*Hab.* Kuranda, Queensland (*F. P. Dodd*).

*Zaspilothynnus obliquestriatus,* sp. n.

♂. Niger; clypeo convexo, sparse punctato, apice late truncato; hypopygio triangulari, angulis basalibus tuberculatis, apice spina armato; clypeo, mandibulis, marginibusque oculorum flavis; alis flavo-hyalinis, nervulis nigris.

♀. Nigra, nitida, sparsissime punctata; capite convexo, longitudine latiore; abdomine segmento primo oblique striato, segmento secundo transverse sex-carinato; pygidio oblique truncato, latitudine fere duplo longiore, obscure longitudinaliter striato.

Long., ♂ 18 mm., ♀ 11 mm.

♂. The clypeus is very strongly convex, the apical margin depressed and broadly truncate. Head, thorax, and median segment closely and finely punctured, the pubescence on the head and pronotum fulvous, on the median segment grey. Abdomen narrowed a little at the extremities, shining, more sparsely punctured than the thorax; sixth ventral segment with a spine on each side at the apical angles; seventh dorsal segment produced into a flattened plate, coarsely punctured and truncate at the apex; hypopygium triangular, distinctly longer than the breadth at the base, with a stout apical spine, the basal angles with a well-developed tubercle. Third abscissa of the radius a little longer than the second; first recurrent nervure received beyond two-thirds from the base of the second cubital cell, second just before one-third from the base of the third cubital cell. The groove between the first and second ventral segments is not deep. The carina between the antennæ is almost transverse; abdominal segments feebly constricted at the base.

♀. Mandibles falcate, acute at the apex; head about half as broad again as long, strongly rounded at the posterior angles, moderately convex; front rather closely punctured above the base of the antennæ, with a short longitudinal sulcus; the vertex shining, with a few scattered punctures. Thorax and median segment shining, with a few shallow punctures; pronotum subrectangular, more than half as broad again as long, the posterior margin arched; scutellum broader than long, broadly rounded at the apex; median segment only half as long as the pronotum. First abdominal segment strongly obliquely striated, second segment with six strong and even transverse carinæ; segments 3–5 shining, with a few scattered punctures. Pygidium obliquely deflexed, about twice as long as broad, the sides parallel, indistinctly longitudinally striated, with a tuft of fulvous

setæ on each side, ventral plate broadly rounded at the apex.

*Hab.* Kuranda, Queensland (*F. P. Dodd*); September.

This species is somewhat intermediate between the genera *Zaspilothynnus* and *Leptothynnus*. Unfortunately the antennæ of the male are broken.

## Family Scoliidæ.

### Subfamily *Elidinæ*.

*Myzine* (*Pseudomeria*) *neavei*, sp. n.

♀. Nigra, nitida, sparsissime punctata, albo-pilosa; flagello mandibulisque basi fusco-ferrugineis; tarsis testaceis; pronoto, mesonoto scutelloque rufis; segmento abdominali secundo fascia interrupta, tertio macula utrinque albis.

Long. 10 mm.

♀. Head subrectangular, nearly half as broad again as long, slightly rounded at the posterior angles, smooth and shining; the clypeus short and transverse. Scape smooth and shining above, clothed with long grey hairs beneath; the basal joint of the flagellum concealed, only ten joints visible, the apical joint the longest. Ocelli small; the eyes ovate and touching the bases of the mandibles. Long grey pubescence on the posterior margin of the head, the anterior margin of the pronotum, the pleuræ, and more sparsely on the sides of the abdomen. Pronotum nearly as long as the greatest breadth, slightly narrowed anteriorly, shining, with a few scattered punctures. Pleuræ closely punctured, the sides of the median segment smooth. Mesonotum very short, smooth; scutellum closely punctured, longer than the mesonotum; median segment shining, obliquely sloped posteriorly. Abdomen shining, with a few scattered punctures, the sixth dorsal segment rounded at the apex. Wings very short, reaching a little beyond the base of the second dorsal segment, the fore wings deeply bilobed, the stigma situated at about one-sixth from the base.

Black; flagellum and mandibles at the base fusco-ferruginous; tarsi testaceous; pronotum, mesonotum, and scutellum red; a transverse band narrowly interrupted in the middle on the second dorsal abdominal segment and a spot on each side of the third white. Wings fusco-hyaline, with a bronze flush.

*Hab.* Mombera District, Nyassaland, 4000 ft. (*S. A. Neave*); June 1910. One specimen.

Type in B.M. (*A. E. R. C.*).

The wings are a little longer than in *dakarensis*, Buyss., but much shorter than in *perornata*, Turn. In the latter species the stigma is placed much further from the base of the wings.

*Myzine politissima*, sp. n.

♂. Niger, nitidus, punctatus; abdomine subtilissime punctato; clypeo emarginato; mandibulis, clypeo, scapo subtus, pronoto antice et postice, segmentis abdominalibus fasciis latis apicalibus flavis; alis hyalinis, nervulis nigris, stigmate testaceo; pedibus flavis.

Long. 14 mm.

♂. Clypeus widely and shallowly emarginate at the apex, nearly twice as broad as long, and produced at the lateral angles into a short spine projecting over the base of the mandibles. Head, thorax, and median segment finely and closely punctured, shining; with rather long white pubescence, which is very close on the front, posterior margin of the head, mesopleuræ, and median segment. Pronotum as long as the mesonotum, strongly narrowed anteriorly. Posterior ocelli widely separated, further from each other than from the eyes; all the ocelli small and situated on the sides of deep depressions. Median segment obliquely sloped posteriorly. Abdomen shining, minutely and shallowly punctured, the segments not constricted; basal segment with a narrow petiole forming the basal third, the apical two-thirds as broad as long, slightly swollen and only a little narrower than the second segment; segments 2–6 very much broader than long; the apical dorsal segment convex, deeply emarginate at the apex, the emargination deeper than the breadth at the apex, the lateral processes rather narrowly produced, bluntly pointed at the apex. Posterior tibia as long as the first joint of the posterior tarsus plus half of the second joint. Second abscissa of the radius slightly longer than the third.

Black; mandibles, except at the apex, clypeus, scape beneath, the apex of the prominence above the base of the antennæ, the anterior and posterior margins of the pronotum broadly, a broad apical band on each dorsal segment and on all except the basal ventral segment, and the legs yellow. Wings hyaline, nervures black, stigma testaceous, tegulæ yellow.

*Hab.* Upper Luangwa River, N.E. Rhodesia (*S. A. Neave*); 27th July–13th August, 1910. A. E. R. C.

This male may be distinguished from all others known to me by the shining and almost impunctate abdomen.

*Myzine rufifrons*, Fabr.

*Larra rufifrons*, Fabr. Ent. Syst. ii. p. 222 (1793).
*Myzine violaceipennis*, Cam. Records Albany Museum, i. p. 301 (1904).
Var. *Myzine erythrostomus*, Cam. Ann. Transv. Mus. ii. 3, p. 117 (1910).

There seems to be absolutely no reason for separating the northern specimens from those from the Cape. The presence of a white spot on each side of the fifth dorsal segment as well as on the three preceding segments is certainly not a sufficient character to form a new species on, this being essentially a variable point in allied species; and the other slight differences mentioned by Cameron seem to me, after an examination of several specimens from various localities, to be overstated. The reckless description of new species on very insufficient material is certainly much to be deplored.

In the same paper (pp. 118–119) Cameron describes two males of the genus *Plesia*, according to his determination, to which unfortunately I can attach no value, as he has previously described males as *Plesia* which beyond doubt belong to *Myzine*. He omits in both descriptions all mention of the form of the basal abdominal segment, which is of much importance in this group, but from his description of the anal segment I consider that the species (*pacificatrix* and *transvaalensis*) are more likely to belong to *Myzine* than to *Plesia*.

*Myzine* (?) *swalei*, sp. n.

♂. Niger, mandibulis, tegulis, tibiis tarsisque pallide flavis; segmentis abdominalibus 2–6 apice flavo trimaculatis; alis hyalinis, nervulis nigris, stigmate magno, vena cubitali ultra cellulam cubitalem tertiam vix producta, cellula radiali apice obtusa; clypeo apice rotundato; segmento mediano longitudinaliter impresso; segmento abdominali primo petiolato, apice nodoso.
Long. 6 mm.

♂. Clypeus a little broader at the apex than long, the apical margin broadly rounded. Antennæ inserted very far apart, about twice as far from each other as from the eyes, gradually thickened towards the apex, the front between them not prominent. Posterior ocelli situated fully twice as far from each other as from the eyes. Ocelli small, eyes shallowly emarginate on the inner margin. Median segment margined at the sides, with a broad, shallow, longitudinal depression in the middle, truncate posteriorly.

Abdomen slender, a little longer than the head, thorax, and median segment combined ; the first segment longer than the second, the basal third forming a narrow petiole, the apical two-thirds swollen ; segments 2–6 slightly constricted at the base ; the apical segment with the emargination broader at the apex than deep, the lateral processes rounded at the apex, the spine of the hypopygium long and sharply recurved. Head and thorax closely punctured and rather thickly clothed with long white pubescence, abdomen more sparsely and finely punctured. Radial cell rounded at the apex, less than twice as long as the greatest breadth, extending on the costa for less than two-thirds of the distance from the apex of the stigma to the apex of the wing, second abscissa of the radius as long as the third, the third cubital cell only about one quarter longer on the cubitus than on radius ; first recurrent nervure received beyond the middle of the second cubital cell, second before the middle of the third cubital cell, the neuration not continued beyond the cubital and discoidal cells.

Black ; the mandibles, tegulæ, a transverse spot in the middle and one on each side of dorsal segments 2–6 pale yellow ; tibiæ and tarsi yellow marked with black. Wings hyaline, nervures black.

*Hab.* Caia, Zambesi R. (*H. Swale*) ; September.

This species is very distinct in neuration from typical *Myzine*, more nearly approaching some of the species of *Iswara*, though in other respects it does not resemble that genus. It can only be placed in *Myzine* provisionally.

### *Elis* (*Mesa*) *pyxidata*, sp. n.

♀. Nigra, mandibulis basi fusco-ferrugineis ; pygidio rufo, striato : alis hyalinis, venis nigris.
Long. 10 mm.

♀. Clypeus sparsely punctured, rounded at the apex. Head and thorax closely and rather deeply punctured, more finely and sparsely round the ocelli and on the scutellum, the median segment finely punctured, with a median groove. Abdomen finely and shallowly punctured, the ventral surface shining and with very scattered punctures ; pygidium closely longitudinally striated, the striæ not reaching the broadly rounded apex. First abscissa of the radius longer than the third, which is a little longer than the second. First recurrent nervure received at the middle of the second cubital cell, second just before the middle of the

third cubital cell. Stigma very small, radial cell not detached from the costa and narrowly truncate at the apex, receiving the strongly oblique third transverse cubital nervure at the apex.

Black, with sparse white pubescence; the mandibles fusco-ferruginous at the base; pygidium red. Wings hyaline, nervures black; spines of the tibiæ white.

*Hab.* Mid-Luangwa Valley, N.E. Rhodesia; August (*S. A. Neave*). A. E. R. C.

### *Elis varicolor*, Turn.

*Elis varicolor*, Turn. Ann. & Mag. Nat. Hist. (8) vii. p. 306 (1911).

A specimen from San Bernardino, Paraguay (*Fiebrig*), in the U.S. National Museum, shows that the reddish colour of the head and thoracic markings in the type were due to discoloration. The Paraguay specimen differs from the type, having the clypeus and antennæ black, and yellow marks on the apical angles and sides of the median segment; the femora are also yellow at the apex. This may prove to be a local race, but I have only seen the two specimens.

### *Elis andina*, Turn.

*Plesia andina*, Turn. Ann. & Mag. Nat. Hist. (8) i. p. 513 (1908). ♀.
*Elis immaculata*, Schrottky, Deuts. ent. Zeitschr. p. 198 (1910). ♀.

These descriptions without doubt refer to the same species.

### *Elis ameghinoi*, Bréthes.

*Elis ameghinoi*, Bréthes, An. Mus. Nac. Buenos Aires, xx. p. 251 (1910). ♂.
*Plesia bonaerensis*, var., Turn. Zool. Jahrb. xxix. p. 223 (1910). ♂ ♀.

I do not think that this is more than a local form of *bonaerensis*, Burm., as I have before suggested. The female is, I consider, the form described by Bréthes as the female of *cuyana*, Burm., but this is not certain. The yellow spots on the median segment of the male are usually present, one on each side near the apex, but occasionally absent. The second recurrent nervure is usually received close to the apex of the second cubital cell, but is sometimes interstitial with the second transverse cubital nervure. There are males of this species in the Berlin Museum from the province of Salta, 3500 ft., the type being from Mendoza.

Subfamily *Tiphiinæ.*

*Tiphia meridionalis,* Turn.

*Tiphia meridionalis,* Turn. Ann. & Mag. Nat. Hist. (8) ii. p. 123 (1908). ♀.
*Tiphia platensis,* Bréthes, An. Mus. Nac. Buenos Aires, xx. p. 255 (1909). ♀.

I think my identification is correct, but M. Bréthes omits to mention the comparative length and breadth of the median segment, an important point in this genus, in all his descriptions of *Tiphia*. This character, however, has usually been overlooked.

Subfamily *Scoliinæ.*

*Scolia* (*Triscolia*) *opalina,* Sm.

*Scolia opalina,* Sm. Journ. Proc. Linn. Soc., Zool. ii. p. 89 (1857). ♀♂.
*Scolia unimaculata,* Kirby, Trans. Ent. Soc., London, p. 446 (1889). ♀.
*Scolia lathona,* Cam. Proc. Zool. Soc. 1901, ii. p. 18. ♂.

This species ranges from Borneo to Tenasserim.

*Scolia erratica,* Sm.

*Scolia erratica,* Sm. Cat. Hym. B.M. iii. p. 88 (1855); Sauss. Ann. Soc. ent. France, (3) vi. p. 211 (1858).
*Scolia molesta,* Sauss. et Sichel, Cat. spec. gen. *Scolia,* p. 111 (1864).

I consider that Saussure's first identification of this species was correct, the description of *molesta* answering well to Smith's type.

*Scolia westermanni,* Sauss.

*Scolia westermanni,* Sauss. Ann. Soc. ent. France, (3) vi. p. 212 (1858).
*Scolia erratica,* Sauss. et Sichel, Cat. spec. gen. *Scolia,* p. 110 (1864) (nec Smith).

Saussure's name *westermanni* should, I think, stand for this species.

*Scolia indica,* Sauss.

*Scolia indica,* Sauss. Mém. Soc. phys. et hist. nat. Genève, xiv. p. 46 (1854). ♀.
*Scolia eliformis,* Sauss. Ann. Soc. entom. France, (3) vi. p. 215 (1858). ♂.

I have taken both sexes at Kandy under circumstances which leave no doubt as to the identity of the species, though not actually *in coitu.*

### *Scolia patara*, Cam.

*Scolia patara*, Cam. Journ. Straits Br. Asiat. Soc. xxxvii. p. 83 (1902). ♂.
*Scolia thyatira*, Cam. *l. c.* p. 138 (1902). ♂.

*S. patara* differs from *thyatira*, as far as I can see, only in the absence of the small yellow marks at the base of the clypeus. The idea of founding a species on such a distinction in this group without the amplest evidence is unreasonable. The difference in the neuration at the apex of the radial cell noticed by Cameron is only imaginary. I have seen a specimen of each labelled "type" by Cameron himself in the National Collection. I consider that descriptions of male *Scoliinæ*, where the female is unknown, are seldom useful, and should only be published after comparison of long series, if at all. I must also protest against the very objectionable habits of some authors as regards types; there should be one specimen only marked as the type of a species, and not every specimen which has been seen by the author. The commercial value of a "type" is unfortunately the cause of much rash and unscientific description and of lax habits in the marking of types.

### *Scolia wahlbergii*, Sauss.

*Lacosi wahlbergi*, Sauss. Stett. ent. Zeit. xx. p. 183 (1859). ♀.
*Scolia wahlbergi*, Sauss. et Sichel Cat. spec. gen. *Scolia*, p. 94 (1864). ♀.

♂. Niger, punctatus, albo-pilosus; clypeo macula obliqua utrinque, orbite exteriore anguste, interiore sub emarginatione oculorum flavis; flagello aurantiaco; alis fusco-violaceis, abdomine iridescenti.
Long. 14 mm.

♂. Clypeus with a few large punctures, broadly truncate at the apex; interantennal prominence transverse at the apex, with a low longitudinal carina, closely and finely punctured; vertex sparsely punctured, a smooth space below the anterior ocellus. Antennæ about as long as the head, thorax, and median segment combined. Thorax very closely but not coarsely punctured; median segment widely and shallowly emarginate posteriorly. First abdominal segment almost as broad as the second, much broader than long, broadly rounded at the base, with a minute and very short carina in the middle at the base. The three anal spines are long. The abdomen is less closely punctured than the thorax, the segments are clothed with white pubescence, thinly on the

basal, more thickly on the apical segments, with the apical margins of the segments indistinctly ciliated. There are a few fulvous hairs on the disc of the mesonotum and on the clypeus. The yellow colour on the inner margin of the eye extends upward to the emargination which is wholly yellow. Radial cell broadly rounded at the apex, extending very little beyond the second cubital cell.

This beautiful species seems to be common round Lake Nyassa, many specimens having been sent by Mr. S. A. Neave (A. E. R. C.) captured in February and March on the south-west shore and on the Upper Shiré. There are also specimens in the Berlin Museum from Langenburg.

### *Scolia* (*Dielis*) *collaris*, Fabr.

*Tiphia collaris*, Fabr. Syst. Ent. p. 354. ♀.
*Scolia senilis*, Fabr. Ent. Syst. ii. p. 237. ♂.
*Scolia eriophora*, Klug, Symb. phys. iii. p. 14. ♂.

The male of this species is very variable, though the form *eriophora* seems to be tolerably constant in the localities in which it is prevalent. In the localities in which the form *senilis* is prevalent, varieties showing more or less tendency to orange-red abdominal bands frequently occur. The localities for the species in the British Museum collection range from the Gambia River to Karachi. The male form *senilis* occurs throughout North Africa from Mogador to Tripoli, there being no specimen in the collection from those localities with the abdominal bands at all strongly developed. In Egypt, Arabia, Baluchistan, and Karachi *eriophora* seems to be constant, and may be called the Eastern form of the male; but a considerable series from Gibraltar and a few specimens from the Gambia are all *eriophora*. The same form also occurs throughout East Africa as far south as Mashonaland and in Madagascar as the male of *Scolia cælebs*, Sichel; which may be looked on as the Ethiopian race of *collaris*. Saussure suggests that *S. dimidiatipennis*, Sauss., is also a form of the female, but apparently the two forms occur together on the Gambia, and in other localities *cælebs* and *dimidiatipennis* seem to occur together, though larger collections and more accurate data are needed before certainty can be reached. The male of *dimidiatipennis* is scarcely to be distinguished from the form *senilis*, though more strongly glossed with blue on the abdomen.

*Scolia* (*Dielis*) *fasciatella*, Klug.

*Scolia fasciatella*, Klug, Symb. phys. iii. p. 17 (1832). ♂.
*Elis aureola*, Klug, Symb. phys. iii. p. 20 (1832). ♀.
*Colpa dimidiata*, Lepel. Hist. nat. Insect. Hym. iii. p. 549 (1845). ♀.

*Hab.* Mogador to Karachi.

There can, I think, be no doubt, after comparison with the nearly allied Ethiopian forms, that *fasciatella* and *aureola* are sexes of one species. It appears to belong to the desert fauna, and is in the British Museum from Mogador, Harkeko, and Karachi. By almost all authors a mistake has been made in confusing it with a common Ethiopian species, in which the mesonotum is highly polished and almost without punctures and the wings strongly infuscated along the costal margin. I consider that the descriptions of Klug and Lepeletier both apply to the North African form, and cannot find that the Ethiopian species, which is distinct from *felina*, Sauss., has received a name. Saussure's description applies to the Ethiopian species, as also does Tullgren's.

*Scolia* (*Dielis*) *hyalina*, Klug.

*Scolia hyalina*, Klug, Symb. phys. iii. p. 18 (1832). ♀.
*Elis* (*Dielis*) *klugii*, Sauss. et Sich. Cat. spec. gen. *Scolia*, p. 172 (1864). ♀.

The male of this little-known desert species is still unknown. It may possibly prove to be *antennata*, Klug, which occurs with *hyalina* ♀ from Mogador to Karachi. Saussure looked on *antennata* merely as a variety of *fasciatella*, and he may be right, both forms having the recurrent nervures nearer together than is usual. It seems to me, however, that the claspers of *fasciatella* are distinctly broader than in *antennata*, though the genitalia are otherwise very similar. In the Escalera collection from Mogador, *hyalina* ♀ was associated with *S.* (*Trielis*) *villosa* ♂; but the differences between *hyalina* and *villosa* are very considerable, though *villosa* is so variable that it is quite possible that *hyalina* may be a desert form of that species. But specimens of *villosa* from Biskra in the Saunders collection differ much from the typical form in another direction, the female having the abdomen red; the clypeus shining, sparsely punctured, with short longitudinal striæ at the apex; the third cubital cell well defined, the radial cell shorter and narrower. In Spanish specimens of the

female the clypeus is marked with a strongly margined triangular area, and the third cubital cell is very rarely present; the colour is black in all specimens I have seen, and the spine of the posterior tibia is more strongly spatulate than in other specimens. The form from S.W. Persia has the clypeus finely and closely punctured and the pubescence more golden, but does not differ much otherwise from the Spanish form. The male of the Biskra form has the antennæ two-thirds as long as the costa, the usual length in other localities being little more than one-half the length of the costa; the third abscissa of the radius is scarcely two-thirds of the length of the second transverse cubital nervure, instead of a little longer as in the normal form, the radial cell is shorter on the costa than the stigma and truncate at the apex, in the normal form very broadly rounded at the apex and longer than the stigma; the fifth dorsal segment is without an apical band and the seventh dorsal segment is red. The shape of the third cubital cell in Albanian specimens is similar to that in Biskra specimens, and the red form of the female seems to be prevalent in Albania.

Further observations on the desert forms are needed.

*Scolia* (*Dielis*) *lindenii*, Lep., subsp. *ceylonica*, Kirby.

*Campsomeris ceylonica*, Kirby, Trans. Ent. Soc. London, p. 452 (1889). ♂ (nec ♀).

This seems to me to be the Ceylon form of *lindenii*; but the male differs from the typical form in the more elongate form of the three basal abdominal segments, the fulvous colour of the abdominal bands and the legs, and the more distinct dark patch at the apex of the fore wing. The female differs from the form of *lindenii* with fulvous pubescence in the smooth area on the disc of the mesonotum and on the middle of the scutellum, and in the greater development of the dark apical patch on the fore wing. The female described by Kirby as *ceylonica* is really a variety of *iris*, Lep., and is not the same species as the male. I have taken *ceylonica* ♂ coupled with *lindenii* ♀ at Kandy, and can therefore speak with absolute certainty.

*S. prismatica*, Sm., seems to be a variety of *lindenii*.

Kirby's mistake in associating the sexes is not surprising, as the colour is very similar.

*Scolia* (*Dielis*) *tasmaniensis*, Sauss.

*Elis tasmaniensis*, Sauss. Mém. Soc. phys. et hist. nat. Genève, xiv. p. 61 (1854). ♀.
*Elis* (*Dielis*) *formosa*, Sauss. et Sich. Cat. spec. gen. *Scolia*, p. 209 (1864), ♀ ♂ ; Turn. Ann. & Mag. Nat. Hist. (8) iv. p. 178 (1909) (nec Guérin).

I was wrong in following Saussure's identification of this insect. Guérin's type was from New Ireland and has the second recurrent nervure incomplete. This species is represented in Queensland by *Scolia* (*Dielis*) *subopaca*, Turn., which may prove to be absolutely identical with *formosa* ; but as I have not seen specimens of that species from the typical locality it is possible that there may be subspecific distinctions. Mantero (Ann. Mus. Civ. Storia Nat. Genova, xl. p. 592, 1900) and Schulz (Berlin. ent. Zeitschr. xlix. p. 212, 1904) refer to specimens of *formosa* from New Guinea, but without noticing the error in Saussure's identification of the Australian species.

In addition to colour differences, which, though small, seem fairly constant, the male *tasmaniensis* may be distinguished from *radula*, Fabr., and *carinifrons*, Turn., by the length of the antennæ. Compared with the length of the costa of the fore wing, this is in *tasmaniensis* as 10 to 14, in *radula* as 9 to 14, and in *carinifrons* as 5½ to 10 in millimetres. The genitalia of *tasmaniensis* and *radula* are very different. The antennæ of *carinifrons* ♂ are much shorter than in the other species.

*Scolia* (*Dielis*) *limosa*, Burm.

*Scolia limosa*, Burm. Abh. naturf. Ges. Halle, i. pt. 4, p. 28 (1853). ♀ ♂.
*Elis mexicana*, Cam. Biol. Centr.-Amer. pt. 112, Hymen. ii. p. 232 (1893).
*Scolia rokitanskyi*, D. T. Cat. Hym. viii. p. 179 (1897).

Cameron's name is undoubtedly a synonym of this common Mexican species.

*Scolia* (*Dielis*) *fallax*, Sauss.

*Elis fallax*, Sauss. Mél. Hymen. i. p. 62 (1854), ♂.
*Campsomeris hyalina*, Lep. Hist. nat. Insect. Hym. iii. p. 497 (1845) (nec Klug).

Klug's name *hyalina* has to be retained for the North-African species, having priority. The name of the well-known S. American species must therefore be changed. Saussure preferred to rename Klug's species *klugii*, but this cannot stand.

## LXVIII.—*On some new Opiliones from Japan and the Loo-Choo Islands.* By S. Hirst.

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The Japanese harvest-men which are described in this note form part of a series of Arachnida collected by Mr. S. Akiyama. Two of the species belong to the suborder Laniatores, which was not hitherto known to occur in Japan. One of these two species is referable to the genus *Sitalces*, E. Sim., a genus which was founded in 1879 for two species occurring on the island of Réunion, and contains also three East-African species recently described by Dr. W. Sörensen, and another (*S. gardineri*, Hirst) from the Seychelles. I take this opportunity to describe an Indian species (*S. indicus*, sp. n.) from Travancore. It is necessary to create a new genus (*Heterobiantes*) for the other species of this suborder, obtained by Mr. Akiyama. Two other species belonging to this new genus were already present in the British Museum collection (*H. geniculatus*, Poc., from Hong Kong, which was described by Mr. Pocock under the name *Epedanus*, and *H. insulanus*, sp. n., from Great Loo-Choo Island). A species of the genus *Systenocentrus*, E. Sim. (Opiliones palpatores), was also represented in Mr. Akiyama's collection. The genus *Systenocentrus* is new to Japan, but is already known to occur in Siam (*S. quinquedentatus*, E. Sim.) and Burma (*S. galeatus*, Thor.), and an Indian species (*Syleus niger*, C. L. Koch) also probably belongs to this genus. A Chinese species (*S. confucianus*, sp. n.) is described below.

### *Systenocentrus japonicus*, sp. n.

*Dorsal surface* of body presenting the appearance of being closely and uniformly granular throughout (see the remarks at the end of this description). A median process, which is well marked although not very large, is present a little behind the anterior margin of the cephalothorax, and a pair of much smaller projections are situated on the margin immediately in front of this process. Ocular tubercle moderately high and about as wide as long; its posterior surface is rounded, but the anterior surface, when viewed in profile from the side, seems almost straight; a conical protuberance, which points in a forward and upward direction, is placed on the front half of its dorsal surface. Spines of dorsal surface five in number and about equal in length.

*Ventral surface.*—A slight crest of granules is present on both sides of the first and fourth coxæ, and on the anterior side of the second and third.

*Chelicera* smooth and shining above, but its proximal segment has a well-marked tooth near the base below.

*Palp.*—Femur moderately stout and slightly swollen on the inner side at the distal end. Patella stout, on the inner side at the apex it is produced into a stout short process. Tibia also stout and rather short, but longer than the patella. Tarsus long and slender, the distal end a little stouter, however, than the proximal; it is about equal in length to the patella + the tibia.

*Legs* fairly long (see measurements); their femora, patellæ, and tibiæ are furnished with very minute granules, but the metatarsi (except their proximal end) and the tarsi are quite smooth.

*Measurements in mm.*—Total length 3·75; length of first leg (from base of femur) 8·75, of second 20·25, of third 9, of fourth 14.

*Colour* of body black; posterior spines (sometimes all the spines) of the dorsal surface paler at the apex. Chelicera deep black. Palp brownish, but its tarsus is sometimes blackish. Coxæ of legs slightly darkened, the trochanters pale, the remaining segments of the legs usually rather dark, but the femur is sometimes very slightly lighter in colour than the distal segments (in one specimen the legs are light brown, only the tarsi being distinctly darkened); the tibia of the second leg is not white at the apex as in *S. galeatus*, Thor., but unicolorous.

*Material.*—Four specimens, collected by Mr. S. Akiyama at Fakoné, Japan, during the month of June, 1910.

*Remarks.*—At first I thought that the dorsal surface of this species was closely granular, but whilst examining a specimen (under electric light condensed by a bull's-eye condenser) I noticed that the heat of the artificial light had turned many of the granules white. On rubbing the surface softly with a blunt instrument many of them became detached and disclosed the fact that it was minutely punctured beneath. The granules of this species seem to consist of secreted matter.

This new species has the cheliceræ smooth and black, as in *S. quinquedentatus*, E. Sim., but seems to differ (judging from Simon's description) from that species in the structure of the ocular tubercle and in the presence of a median projection just in front of the anterior margin of the cephalothorax. The ocular tubercle resembles somewhat that of *S. galeatus*, Thor., but the tibia of the second leg lacks the

white apical band which Thorell states to be present in that species.

*Note.*—The specimens on which the description of this new species is based probably are immature, and I think that *S. galeatus*, Thor., is also described from an immature specimen; both seem to be quite distinct species, however.

*Systenocentrus confucianus*, sp. n.

*Dorsal surface* of body very finely granular; in addition to the very minute granules, several indistinct transverse rows of obsolete but rather larger granules are also present, and on the abdominal part of the dorsal surface one of these rows is usually placed in a line with each of the large central spines; the middle of the front of the cephalothoracic area is rather high, and is furnished with a group of conical tubercles (very similar to those which are present in the same position in some of the species of the genus *Lepenus*). Ocular tubercle low; although obsolete, the median groove can still be distinguished, but it is very shallow and indistinct; on either side of it a few very minute granules are present. Close to the posterior margin of the dorsal surface and in a line with the five large spines a conical granule is present.

*Palp* resembling that of *S. japonicus*, sp. n., rather closely in structure, but the patella without any process.

*Legs.*—Several distinct denticles are present at the apex of the upper surface of the femora and patellæ, and a denticle is present on either side at the apex of the tibiæ; femora sparsely furnished with obsolete granules and short hairs, and the distal segments with numerous fine short hairs.

[No mention is made in this description of the armature of the basal segments of the limbs.]

Total length 6 mm.

*Colour.*—Body black; proximal segments of the legs (including the femora and patellæ) blackish, their tibiæ brownish; metatarsi and tarsi paler brown. Chelicera blackish. Palp with all the segments dark except the tarsus, which is rather light brown, but slightly darkened at the tip.

*Material.*—A single dry specimen from Taipaishan, Shensi Province, China; presented by the Hon. Walter Rothschild.

Genus Sitalces.

In *S. akiyamæ*, sp. n., and *S. indicus*, sp. n., the palp is armed with fairly strong spines of the usual Epedanid type, and Dr. W. Sörensen's figures of *S. typus*, W. S., *S. horridus*, W. S., and *S. mordax*, W. S., show that the spines borne by

the palpi of those species are similar in nature. The spines of the palp of *S. gardineri* are shorter and the basal portion of nearly all of them is short.

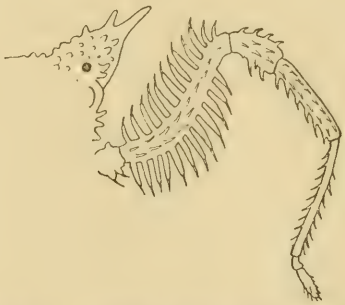
As in other genera of the family Epedanidæ, the number of tarsal segments is variable in this genus and seems to be only of specific importance.

*Sitalces akiyamæ*, sp. n.

*Body* very slightly longer than the metatarsus of the fourth leg and much longer than the tibia of the second or fourth.

*Scutum* without any conspicuous processes (except those on the anterior margin and the ocular tubercle and its processes); the greater part of its surface is covered with granules, each bearing a short stout hair, but anteriorly at the sides a considerable area is smooth and without granules; below this smooth area and close to the margin a group of rather coarse granules is present; on the anterior margin (on either side of the ocular tubercle) three conical processes occur; just behind the ocular tubercle there is a pair of slightly enlarged granules, and in the middle of the last segment (posterior margin) of the scutum a rather large granule is present (a similar granule being present in the middle of the first two of the free abdominal segments). Ocular tubercle with the characteristic processes only moderately developed (fig. 1).

Fig. 1.



*Sitalces akiyamæ*, sp. n. Lateral view of ocular tubercle and first leg.

*Chelicera* with the two proximal segments about equal in length. First (proximal) segment armed with a longitudinal series of processes on each side below; on the outer side these processes are five in number (not counting two small

ones at the base), and they are rather long and blunt, the middle ones being truncate at the end, the others bluntly pointed; processes of the inner side four in number, they are much shorter than those on the outer side, and all of them are bluntly pointed. Second segment of the chelicera with four fairly long processes (or teeth) arranged in a longitudinal row near the inner side of its dorsal surface, and in the middle of it there is a row of 6–8 granules running parallel with the inner row of processes. Fingers armed with minute teeth only.

*Palp* armed with long spines. Its femur has an apical spine on the inner side above, a row of three spines near the proximal end below, and another much smaller spine close to the distal end. Patella with two spines on the inner and one on the outer side. Tibia with three spines on each side, but those of the proximal pair are smaller than the others (on one palp the inner spine of the proximal pair is missing, but doubtless this is an individual abnormality). Tarsus with two spines on each side.

*Legs* comparatively short. Trochanter of *first leg* with a conical tubercle above and two below. Dorsal and ventral spines of femur numerous, stout, and placed close together; in the upper row there are 12–13 of them and in the lower 11. Patella fairly long; dorsally it has a number of tubercles and also of fairly long processes towards the inner side; two or three tubercles are present on its lower surface. Tibia longer than patella; it has an inner row of nine processes and an outer row of conical granules, much smaller in size than the processes of the inner side. Metatarsus with only minute granules (in the series on each side), but each granule carries a stiff pointed hair or seta, much resembling that which is carried by the processes of the proximal segments of the limb, only weaker. Tibia of *second leg* slightly longer than its metatarsus and than the tibia of the fourth. Number of tarsal segments 3, 4, 5, 5. [My figures of the first leg of this species and of *S. indicus* show only two tarsal joints, but there are really three. In the figure of *S. akiyamæ* the short hairs on the sides of the segments of the first leg are drawn too large. They must not be mistaken for spines.]

Length of body 4 mm.

*Colour.*—Dorsal surface deep, almost blackish brown; the scutum with some paler brown markings; ventral surface paler than the dorsal surface. Chelicera and palp somewhat darkened; legs deep brown except for the tarsi, which are pale.

*Material.*—A single male example, collected by Mr. S. Akiyama at Idzu, Japan (June 1910).

*Remarks.*—Apparently rather closely allied to the East-African species described (under the generic name *Palpipes*) by Dr. W. Sörensen, but it can be readily distinguished from them by the number of the tarsal segments of the anterior legs and by the armature of the scutum &c.

In the three species that I have been able to examine (the two new species described in this paper and *S. gardineri*, Hirst) the segments of the posterior tarsi are five in number; Dr. Sörensen states in his description of the three East-African species that the tarsi of the posterior legs are divided into four segments, but perhaps he has overlooked one of the segments.

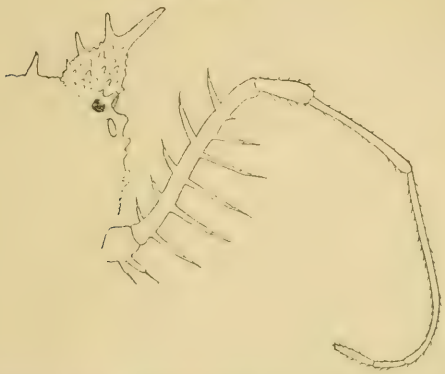
*Sitalces indicus*, sp. n.

*Body* about as long as the tibia of the fourth leg and very much shorter than the tibia of the second.

*Scutum* bearing a number of processes and enlarged granules, which are arranged in transverse rows, a row being situated a little in front of the posterior margin of the cephalothoracic area and also one on each of the abdominal segments (the limits of which are difficult to make out). The central processes, which are paired, are mostly of large size; those of the central pair of the fourth abdominal segment are the longest of all; next in size come those of the middle pair of the cephalothoracic row, but they are much shorter than those of the fourth abdominal; shorter still are those of the first, second, and third abdominal segments; in the third segment the process which is situated on the outer side of those of the middle pair is equal to them in size or even longer. A number of tooth-like projections are placed along the anterior margin of the scutum (on each side of the ocular tubercle) and one is present on the arch-like structure which joins the ocular tubercle. The coarse granules which bear hairs are not very numerous in this species, a large proportion of them being situated in the transverse rows; in the middle of the scutum between the larger processes they are entirely absent, but a few scattered microscopic granules are present there and on other parts of the scutum. *Ocular tubercle* high, conical, and very much more erect than that of *S. akiyamæ*, sp. n.; the three principal processes are very well-developed, the two anterior ones being very long, especially the anteriormost; besides these three processes a number of granules are present, not only on

the posterior surface and sides, but also in front; several of those on the sides are somewhat enlarged and tooth-like, perhaps the most conspicuous being the one which is placed above the eye. (Fig. 2.)

Fig. 2.



*Sitalces indicus*, sp. n. Lateral view of ocular tubercle and first leg.

*Chelicera.*—A minute denticle is present dorsally on the inner side of the proximal segment at a little distance from its apex, and a few very minute granules also occur at the sides below.

Second segment slightly longer and much stouter than the proximal one. Two processes (or teeth) are present on the inner side of its dorsal surface near the proximal end, the more distal of the two being much the larger; another denticle is situated at a little distance to the outer side of these two processes; several granules bearing fine hairs occur near the base of the immovable finger; a fine line, composed of microscopic granules, runs from the larger process of the dorsal surface to the base of the immovable finger; near the base on the inner side below a curiously shaped projection is present, and in the middle of the (ventral) surface a pair of dentiform processes (or teeth) are present, one on each side of the segment.

Proximal tooth of the row (of four) on the edge of the immovable finger larger than the others; besides these teeth on the edge a denticle is present on the inner side. A very large tooth is present on the edge of the movable finger at an equal distance between its proximal end and the three

teeth at the distal end; of the latter the proximal one is slightly the largest.

*Palp* armed with long spines. Trochanter with a granule on the dorsal surface and with a conical granule at each end and a process in the middle below. Femur with the usual apical spine on the inner side of the dorsal surface and also with a short rounded tubercle near the proximal end; ventrally it has a row of three spines near the proximal end and another spine near the apical end, the latter is not short (as it is in *S. japonicus*), but almost as well developed as the ones near the proximal end. Patella with two inner and one outer spine. Tibia with three and tarsus with two spines on each side.

*Legs* much longer than those of *S. japonicus*.

Trochanter of *first leg* armed below with a spine and a conical tubercle. Its femur has fewer spines than that of *S. japonicus* &c., and they are longer, more slender, and separated from one another by greater intervals than is the case in that species; both on the dorsal and ventral surface these spines are five in number. Patella, tibia, and tarsus without either distinct granules or processes, only short hairs being present on these segments; patella short, but the tibia long and slender, its length being considerably more than twice that of the patella (fig. 2).

Tibia of *second leg* only very slightly shorter than its metatarsus and much longer than the tibia of the fourth.

Number of *tarsal segments* 3, 7, 5, 5.

*Measurements in mm.*—Total length 3·25; length of first leg about 7·4, of second ?, of third 11, of fourth 15.

[*Colour.*—The unique specimen has been preserved in alcohol for a good many years and seems rather bleached; I think it would be useless therefore to attempt to describe the coloration.]

*Material.*—A single specimen captured at Ponmudi (2500 feet), Travancore, by Mr. H. Ferguson during the year 1899.

*Remarks.*—Easily recognizable by the structure of its first leg &c.

### Pseudobiantes, gen. nov.

Allied to *Epedanus*, Thorell, which it resembles in the shape of the ocular tubercle &c., but differing from that genus in having the patella of the palp unarmed. Tibia and tarsus of palp usually much stouter than the other segments,

and the tarsus strongly bent downwards, so that its spines work against the tibia.

The structure of the palp in this new genus is very similar to that of the Opiliones of the family Hinzuanidæ (=Biantidæ). In *P. japonicus*, sp. n., the femur of the palp is quite unarmed except for a conical granule placed near the base below, and thus resembles completely that of the Hinzuanidæ. In *P. geniculatus*, Poc., and *P. insulanus*, sp. n., there may be only a row of granules on the ventral surface of the palp or a row of quite well-developed processes may be present; these processes do not bear spines, but only fine hairs.

Type species, *P. japonicus*, sp. n.

*Pseudobiantes japonicus*, sp. n.

*Scutum*.—A pair of sharply pointed processes, which are well marked although not very long, are present in the middle of the second of the four divisions into which the abdominal part of the scutum is divided; and a pair of minute obsolete granules, placed further apart from one another than the processes of the second division, occur on the third. Obsolete granules may also be present on the last segment of the scutum and on the lateral margins; except for the pair of processes and the inconspicuous granules mentioned, the surface is quite smooth. *Ventral surface*: coxa of first leg furnished with a number of granules.

*Chelicera*.—Second segment with a number of granules on its dorsal surface, the one which is placed nearest to the apex being the largest.

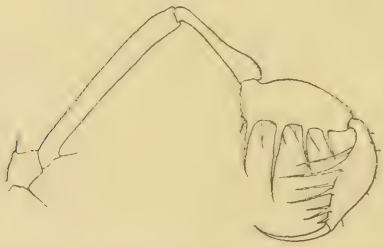
♂. Chelicera of the male a little more swollen than that of the female, especially its second segment. A small tooth is situated at the proximal end of the immovable finger, and it is followed by a large tooth, and then comes a row of four teeth, the proximal one of them being fairly large, the others minute. A fair-sized tooth is present near the proximal end of the movable finger, and it is separated from the row of teeth at the distal end by a slight gap; the latter are four in number, two being large and two small.

♀. In the female sex the edge of the immovable finger of the chelicera is armed with minute teeth only. Movable finger with a row of three teeth near the distal end, the proximal one being the largest.

*Palp*.—A sharp conical granule, which bears a hair, is present on the dorsal surface of the trochanter and another

similar granule on its ventral surface. Femur only with a conical setiferous granule, which is situated near the proximal end below. Patella quite smooth and without either granules or processes. Tibia and tarsus strongly armed. Tibia with three spines on its inner side, the first and second being long, but the apical one shorter; on the outer side it has four spines, the second one from the proximal end being the longest and the first one next in size; several much smaller spines are placed in the middle of the ventral surface. Tarsus with four spines on each side, but those of the apical pair are very small, especially the one on the outer side, which is practically obsolete. (Fig. 3.)

Fig. 3.



*Pseudobiantes japonicus*, sp. n. External view of palp.

*Legs.*—Number of tarsal segments 8, 17–19, 7, 8.

*Measurements in mm.*—Total length 3·5; length of palp (from base of femur) about 6, of first leg 9·5, of second 14·75, of third 11, of fourth 14·75.

*Colour.*—Ground-colour whitish. Cephalothoracic area of scutum marked with a broad median fuscous band and also with a dark marginal line on each side; abdominal segments of the scutum (with the exception of the last one) dark at the sides but pale in the middle; the two anterior free segments are also darkened at the sides, but the last has only a dark spot in the middle. Anal operculum wholly dark; the rest of the ventral surface whitish. Proximal segment of chelicera and the base of the second segment slightly darkened dorsally. Femur and patella of palp slightly darkened at each end; the tibia and tarsus rather deeply infuscate (dark grey) and contrasting rather strongly with the other segments of the appendage. The principal markings of the legs are as follows:—Femora somewhat darkened at the distal end; patellæ usually entirely greyish above; tibiæ at least with a

distinct dark ring near the apex, but often more extensively darkened; the apex of the metatarsi and the tarsal segments are usually slightly darkened also.

*Material.*—A male and female, collected by Mr. S. Akiyama at Idzu, Japan.

*Pseudobiantes insulanus*, sp. n.

♂. *Scutum* unarmed; a few indistinct and obsolete granules only are present on the posterior segments of the scutum and a number of obsolete granules along the lateral margins. *Ventral surface*: coxæ of first leg with a number of granules as in *P. japonicus*, sp. n.

*Cheliceræ.*—Second segment considerably swollen; near the inner side of its dorsal surface it is furnished with three granules arranged in a longitudinal series, two of them being minute, but the apical one large and conical. A row of four teeth is present on the edge of the immovable finger; the first two teeth (counting from the proximal end) are rather large, the two remaining ones minute. Close to its proximal end the edge of the movable finger is armed with a fairly large tooth, which is separated by a considerable gap from the four teeth of the distal half; the latter resemble those of the immovable finger, the first two of them being fairly large and the other two small.

*Palp.*—Trochanter armed above with a conical process and with two others below. A row of granules is present on the upper surface of the femur and a row of six well-marked processes on its ventral surface; a dentiform granule is situated on the inner side below. Tibia and tarsus strongly armed; the number and relative size of the spines being exactly the same as in *P. japonicus*.

*Legs.*—Number of tarsal segments 9, 20, 7, 8.

*Measurements in mm.*—Total length 3·75; length of first leg (from base of femur) 11·75, of second 19, of third 15, of fourth 19·75.

[*Colour.*—Owing to the length of time that this specimen has been preserved in spirit the markings have practically disappeared, and so I have not described the coloration.]

♀. In the same tube as the male example described above there is another specimen which I identify with doubt as the female of the same species. It is much darker in colour than the male specimen, and differs also in the following details of structure:—

*Chelicera.*—Second segment not swollen, and none of the four granules of the row on its dorsal surface are of large

size. First (proximal) tooth of the row of five teeth which is present on the edge of the immovable finger a little larger than the others, which are very minute. Movable finger without any distinct tooth at its proximal end, only a slight low lobation being present there; distally it is armed with a row of four teeth, the first one of them alone being of large size.

*Palp.*—A conical granule is present on the dorsal surface of the trochanter and two minute granules below. Femur with only one or two microscopic granules on its dorsal surface; near the proximal end of its ventral surface there is a short process, and a longitudinal series of minute granules is also present below.

*Legs.*—Number of tarsal segments 5, 19, ?, 9.

*Measurements in mm.*—Total length 4·5; length of first leg 10·25, of second 17·25, of third ?, of fourth 17·5.

*Note.*—The differences in the structure of the chelicera are certainly due to sex, and the presence of a row of minute granules instead of processes on the ventral surface of the femur of the palp of this specimen is probably only an individual variation, for in *P. geniculatus*, Poc., this segment of the palp may be armed below with distinct processes or only with granules. Nor do I attribute any importance to the difference in colour between these two specimens, for they have been preserved a long time in alcohol, and the male is much bleached.

*Material.*—A male example (the type) collected by Mr. Holst in the forest near Motobu, Great Loo-Choo Island, and a female example (from the same locality) which is perhaps referable to the same species.

### *Key to the Species of the Genus* Pseudobiantes.

*a.* Second abdominal division of scutum armed with a pair of small but distinct thorns; femur of palp without any row of processes below .... *P. japonicus*, sp. n.

*b.* Scutum unarmed; femur of palp with a row of granules or processes below.

*a'.* Four distinct spines on outer side of tibia of palp (they must not be confused with the small spines in the middle of the lower surface); narrowed proximal portion of patella of palp long ..... *P. insulanus*, sp. n.

*b'.* Only three distinct spines on outer side of tibia of palp, the distal one being either very minute or absent; narrowed portion of patella short ..... *P. geniculatus*, Poc.

## LXIX.—*Descriptions of Four new African Fishes of the Genus* Mastacembelus. By G. A. Boulenger, F.R.S.

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### *Mastacembelus batesii.*

Depth of body 15 to 16 times in total length, length of head 8 to 9 times. Vent equally distant from end of snout and from caudal, its distance from head 3 to $3\frac{1}{2}$ times length of latter. Snout 3 to 4 times as long as eye, ending in an appendage which is a little longer than eye; mouth extending to below anterior third or centre of eye; no præorbital or præopercular spines. Dorsal XXX–XXXIII 80–90; spines extremely short, last scarcely longer than eye; distance between first spine and head $\frac{2}{3}$ to $\frac{4}{5}$ length of head. Anal II 80–90. Caudal rounded-subacuminate. Scales very small, 16–18 between origin of soft dorsal and lateral line; latter formed of a few tubules widely separated from one another. Brown or olive above, with dark spots or marblings and a vertebral series of small black spots; a regular series of round or squarish dark brown spots on each side of the back, sometimes confluent into a wavy band; yellowish on the sides, with a more or less distinct brown network; dorsal and anal fins spotted with brown.

Total length 320 mm.

Several specimens, from the Ja River at Bitye, South Cameroon (Congo Basin), were sent to the Natural History Museum by Mr. G. L. Bates.

### *Mastacembelus ubangensis.*

Depth of body 15 to 16 times in total length, length of head 7 times. Vent equally distant from head and from caudal, its distance from head 3 times length of latter. Snout twice as long as eye, ending in an appendage which is hardly as long as eye; mouth extending to below anterior border of eye; a strong erectile spine below nostril; two strong præopercular spines. Dorsal XXIX–XXX 110; distance between first spine and head $\frac{2}{3}$ length of latter. Anal II 110. Caudal pointed. Pectoral $\frac{1}{4}$ length of head. Scales very small, about 15 between origin of soft dorsal and lateral line. Brownish, with an ill-defined darker band along the side of the head and body; vertical fins whitish, with a series of large black spots at the base of the posterior part of the dorsal; a black spot on the caudal.

Total length 100 mm.

Two specimens (probably young) from Banzyville, Ubanghi, from the collection of Captain Royaux. One is preserved in the Congo Museum, Tervueren, the other in the Natural History Museum. I had previously referred them to *M. marmoratus*, Perugia.

*Mastacembelus brevicauda.*

Depth of body 13 to 14 times in total length, length of head 7 to 8½ times. Vent equally distant from head or præoperculum and from caudal, its distance from head 3 to 3½ times length of latter. Snout 3 times as long as eye, ending in an appendage which is as long as eye; mouth extending to below anterior third or centre of eye; no præorbital spine; 2 or 3 small præopercular spines. Dorsal XXIX–XXXII 70–80; spines very short, last scarcely longer than the eye; distance between first spine and head ⅔ to ¾ length of head. Anal II 70–80; first spine minute, often very indistinct. Caudal obtusely pointed. Pectoral ½ length of head. Scales very small, 15–17 between origin of soft dorsal and lateral line; latter formed of a few tubules widely separated from one another. Olive-brown above, usually with a more or less distinct dark brown band on each side of the back above the lateral line, and a vertebral series of small dark brown spots corresponding with the spines; sides mottled with dark brown; caudal region marbled with dark brown, with light spots towards the caudal fin, which bears one or several large black spots and is edged with whitish; yellowish beneath, sometimes with a brown network.

Total length 200 mm.

Numerous specimens from South Cameroon (Kribi River, Zima Country, Ja and Bumba Rivers), received from Mr. G. L. Bates.

*Mastacembelus reticulatus.*

Depth of body 11 to 12 times in total length, length of head 7 to 7½ times. Vent equally distant from head and from caudal, its distance from former 3 times length of latter. Snout 3 times as long as eye, ending in an appendage which is 1½ times as long as the eye; mouth extending to below nostril; no præorbital spine; two strong præopercular spines. Dorsal XXXI–XXXII 90; spines extremely short, last not longer than eye; distance between first spine and head ½ length of head. Anal II 90–95; first spine extremely short, very indistinct. Caudal rounded. Pectoral ¼ length

of head. Scales very small, 20 between origin of soft dorsal and lateral line; latter formed of a few tubules widely separated from one another. Brownish, with dark lines forming a wide-meshed network; dorsal, anal, and caudal fins blackish, with round white spots more or less regularly arranged, and a white border.

Total length 190 mm.

Two specimens from Sierra Leone, presented to the Natural History Museum by the Liverpool School of Tropical Medicine.

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## LXX.—*Descriptions of new Genera and Species of Oriental Homoptera.* By W. L. Distant.

### Fam. **Fulgoridæ.**

### Subfam. *Derbinæ.*

*Phenice pullata*, sp. n.

Head and thorax above piceous, pronotum black; body beneath black; metasternum and legs stramineous; coxæ piceous; abdomen above black, spotted with ochraceous; tegmina dark fuscous, the costal area white, with large dark fuscous spots, the second from base largest and longitudinal, the others transverse, the inner area broadly and irregularly white, the fuscous extending through it to inner margin near base and before middle, two white spots on apical margin, the lowermost large, the upper one small, the apices of the veins on inner margin are fuscous; wings fuliginous, with the veins fuscous, the posterior marginal area suffused with white; antennæ ochraceous.

Long., excl. tegm., 3 mm.; exp. tegm. 19 mm.

*Hab.* N.W. Ind. Prov.; Kumaon District.

Allied to *P. mœsta*, Westw., but larger, markings of tegmina different, &c.

*Phenice ferruginea*, sp. n.

Vertex of head and pronotum sordidly greyish; mesonotum fuscous brown, with the lateral and basal margins (the latter broadly), a central straight longitudinal carination, and a broader waved longitudinal fascia on each lateral area sordidly greyish or very pale virescent; abdomen above fuscous

brown, the segmental margins black, with greyish spots; head beneath, sternum, and legs ochraceous; abdomen beneath transversely fuscous and ochraceous; tegmina fuliginous, with the veins ferruginous, costal membrane with a distinct series of sordidly greyish spots, some more indistinct spots of the same colour on basal area, and three or four short greyish-white lines at apex, beyond the apex of costal membrane three or four short, transverse, ferruginous, waved, linear spots, and the whole area of the tegmen more or less obscurely mottled with greyish; wings fuliginous, the veins ferruginous; vertex rather broader than in most species of the genus and distinctly longitudinally grooved; second joint of antennæ not reaching apex of head; face rounded, narrow, not angularly, laminately projecting; clypeus a little longer than face; abdomen above strongly, centrally, longitudinally ridged; scutellum centrally longitudinally compressed.

Long., excl. tegm., 4–5 mm.; exp. tegm. 20–23 mm.

*Hab.* Travancore; Maddathoray and near Trivandrum (*Annandale*).

Allied to *P. superba*, Dist.

*Zoraida variipennis*, sp. n.

Body above shining fuscous brown; pronotum pitchy black, abdomen somewhat largely spotted with ochraceous; second joint of antennæ ochraceous, with its apex black; body beneath and legs pale bright ochraceous; tegmina hyaline, the veins more or less ferruginous, costal membrane at extreme base and beyond middle to apex purplish red, with minute black spots, basal area, an irregular transverse central fascia, and a transverse fascia near apex dark fuliginous; wings hyaline, with the veins pale sanguineous; second joint of antennæ only a little shorter than head and thorax together; vertex narrow, somewhat triangular; mesonotum obsoletely tricarinate; abdomen centrally longitudinally ridged.

Long., excl. tegm., 3½ mm.; exp. tegm. 22 mm.

*Hab.* Ceylon; Madulsima (*Fletcher*).

*Zoraida spectra*, sp. n.

Body pale ochraceous; legs stramineous; eyes black; tegmina and wings hyaline, the venation a little darker; second joint of antennæ pale ochraceous, about as long as head and thorax together; vertex very narrow; face very

narrow, prominently longitudinally ridged; clypeus slightly longer than face; mesonotum obscurely tricarinate; posterior tibiæ distinctly spined beyond middle; tegmina about three times longer than greatest breadth, the apical margin subtruncate, the inner margin slightly dilated beyond clavus; wings short, extending a little beyond the clavus of tegmen.

Long., excl. tegm., 3 mm.; exp. tegm. 18 mm.

*Hab.* N.W. India (Brit. Mus.).

Allied to *Z. gilva*, Dist., from Ceylon, but a smaller species, the tegmina less broadened, the venation darker, the apical veins also quite different, being much more strongly oblique in *gilva* than in *spectra*.

ROBIGUS, gen. nov.

Head narrow, vertex strongly projecting in front of eyes, a little broadened anteriorly, the lateral margins distinctly acutely raised, the apical angles slightly prominent; face long and narrow, the lateral margins distinctly raised, longer than clypeus, which is centrally ridged; pronotum narrow, the lateral margins ampliated and distinctly forwardly produced on each side of eyes; mesonotum tricarinate; abdomen with the segmental incisures profound, above with the apical area narrowed and angulated; legs of moderate length, posterior tibiæ not spined; tegmina more than three times as long as broad, with distinct series of apical and subapical cells, two longitudinal cells at end of radial area, and above these the contour of the costal margin is distinctly broken by an irregular, raised, longitudinal, cellular interspace; the tegminal apices are slightly narrowed and rounded; wings shorter and a little broader than tegmina, the venation complicated by the vein at end of radial area being concavely sinuated and bifurcating at about half its length, forming a marginal cell, before apex a transverse vein defining three apical cells.

A genus to be placed near *Interamma*, Walk.

*Robigus sanguineus*, sp. n.

Body and legs sanguineous, mottled with ochraceous, the tibiæ and tarsi ochraceous, the apical area of the abdomen above (excluding apex) pitchy black; tegmina ochraceous, much suffused with sanguineous, the latter coloration more prominent on the costal and apical areas and in some macular markings on disk, on apical margin two or three rather obscure greyish spots; wings sanguineous, with their extreme bases ochraceous.

Long., excl. tegm., 3 mm.; exp. tegm. 14½ mm.

*Hab.* Ceylon; Kandy (*Green*).

Mr. E. E. Green sent me a single example of this beautiful and distinct genus and species.

### Dawnaria, gen. nov.

Head short, the vertex narrow, continued moderately in front of eyes, its apical angles slightly prominent; face long and narrow, about equal in length to clypeus; antennæ with the second joint prominent, scarcely shorter than head; pronotum narrow, slightly widened towards the lateral angles; mesonotum tricarinate, but the central carination very indistinct; abdomen short and broad, above centrally ridged, little angulated on each side before apex; legs of moderate length, posterior tibiæ not spined; tegmina more than three times as long as broad, narrow, but gradually widening from base to apex, which is obtusely angularly rounded, the veins mostly longitudinal, but furcating on apical area, form a cluster of apical cells, and a longer cell on apical margin; wings very long, about as broad but only a little shorter than tegmina, two transverse veins on upper disk beyond middle, and a single apical cell.

### *Dawnaria atroterminata*, sp. n.

Body above ochraceous; a central line on disk and apical margins of abdomen above black; body beneath and legs very pale ochraceous; tegmina tawny brown, with three broken transverse greyish-white fasciæ—the first near base, broken in the middle, second near middle, dislocated near costal margin, the third near apex, short and discal,—costal area greyish white, with longitudinal dark tawny spots, a dark somewhat rounded spot near apex; wings hyaline, reflecting opaline lustre.

Long., excl. tegm., 2 mm.; exp. tegm. 11 mm.

*Hab.* Lower Burma; Dawna Hills.

### Sumangala, gen. nov.

Head rather long, narrow, vertex distinctly projecting beyond the eyes, face compressed, rounded from vertex, long and narrow, longer than the clypeus; pronotum very short, the lateral areas dilated and subangularly produced transversely and a little forwardly; mesonotum broad, broader than long, the lateral margins rounded; anal appendages bilobate; tegmina about twice as long as greatest width,

much narrower at base than at apex, costal margin rounded, costal membrane broad, with three transverse veins, sometimes placed near apex or sometimes one near middle, the other two near apex, about eight apical areas, the ulnar area immediately below radial area very long, radial area narrow; wings a little narrower and shorter than tegmina, radial area apically broadened, three apical areas, apex of radial area well defined by obliquely transverse veins.

By the venation of the tegmina this genus is allied to *Kermesia*, Melich., by the structure of the face it is more allied to *Rhotana*, Walk.

*Sumangala delicatula*, sp. n.

Body and legs pale ochraceous; the compressed margin of face and the sublateral margins to pronotum more or less sanguineous; tegmina creamy white, subhyaline, the veins mostly very pale fuscous, on the apical area some of the veins are infuscated, the most prominent of these fuscous markings being at the apex of clavus and continued along the apices of the two cells above it, and a curved line reaching costal margin a little before apex, some of the longitudinal veins defining the lower apical areas bear a small pale fuscous spot; wings creamy white, subhyaline, the veins almost concolorous.

Long., excl. tegm., 2 mm.; exp. tegm. 9 mm.

*Hab.* Ceylon; Nuwara Eliya, Pattipola (*Green*).

Alara, gen. nov.

Vertex of head very narrow, slightly projecting beyond eyes; face long, narrow, a little widened before clypeus, which is long, broad, centrally and laterally finely carinate; antennæ short, inserted near base of clypeus, second joint very robust; pronotum narrow, triangularly anteriorly produced, the lateral areas moderately foliaceously ampliate; mesonotum broad; legs long and slender; tegmina short, broad, costal margin rounded, narrowed and sinuate at base, costal area broad, with a few transverse veins, apical areas numerous and short, a subapical series of transverse discontinuous veins, two transverse discal veins a little beyond base; wings a little narrower and shorter than tegmina.

A genus to be placed near *Kermesia*, Melich.

*Alara dux*, sp. n.

Body and legs ochraceous; anterior femora and apical area

of abdomen castaneous; tegmina subhyaline, talc-like, suffused with pale fuscous, which is broken on costal and apical areas and also near end of clavus, extreme costal margin in places carmine-red; wings creamy white.

Long., excl. tegm., 2 mm.; exp. tegm. 9 mm.

*Hab.* Ceylon; Maskeliya, Kandy (*Green*).

PERANDENINA, gen. nov.

Head (including eyes) considerably narrower than pronotum, vertex projecting beyond the eyes, somewhat flat, its apex truncate, its base concavely emarginate, face narrow, the lateral margins very strongly ridged, from behind eyes gradually narrowed to clypeus, which is moderately convex and centrally longitudinally ridged; pronotum narrow, widened at its lateral areas, the posterior margins of which are more or less obliquely truncate, the base strongly concavely emarginate; mesonotum large, four times as long as pronotum, rather obsoletely tricarinate on vertex; legs of moderate length, posterior tibiæ not spined, basal joint of posterior tarsi elongate; tegmina elongate, about four times as long as broad, the margins parallel, costal margin distinctly sinuate near base, apical margin truncately rounded, veins longitudinal, costal membrane not transversely veined, about seven short apical areas, the uppermost immediately preceded by two short and broad cells, two distinct elongate basal cells, followed by four elongate subapical cells; wings ample, considerably broader and only moderately shorter than tegmina; rostrum short, robust, the apical joint minute.

Allied to *Kamendaka*, Dist.

*Peradenina typica*, sp. n.

Vertex of head, mesonotum, body beneath, and legs bright ochraceous; pronotum and sometimes vertex of head distinctly paler; eyes black; tegmina and wings cretaceous white, moderately tomentose, the upper and apical areas of the latter with opaline lustre; other characters as in generic diagnosis.

Long., excl. tegm., 3 mm.; exp. tegm. 12 mm.

*Hab.* Ceylon; Peradeniya (*Green*). Kumaon; Bhim Tal, 4500 feet (*Annandale*).

CHAPRINA, gen. nov.

Head (including eyes) very much narrower than pronotum, vertex prolonged in front of eyes, its lateral margins

ridged, its apex angulated; face long and narrow, the lateral margins very strongly ridged, slightly widened before clypeus, which is shorter than the face and with its margins strongly ridged; pronotum very short, especially behind head, the lateral areas angularly dilated; mesonotum finely tricarinate; legs of moderate length, posterior tibiæ not spined; tegmina about three times as long as broad, a little widened apically, the costal and inner margins nearly parallel, the apical margin a little rounded and sinuate, a series of short irregular apical cells continued round the apex of costal area, on lower portion of which near apex is a short narrow longitudinal cell; wings broader and a little shorter than the tegmina, the radial area long.

A genus to be placed near *Tapoosa*, Dist.

*Chaprina nigromaculata*, sp. n.

Head, pronotum, and mesonotum ochraceous, more or less greyishly tomentose; abdomen above fuscous, a greyish-white transverse fascia near base, the apical area ochraceous, with transverse black spots; head beneath, sternum, and legs more or less ochraceous; abdomen beneath castaneous brown, its apex ochraceous; tegmina creamy white, with waved irregular ochraceous markings, these principally consist of some obliquely transverse lines in costal area, a subtriangular fascia near base continued from about end of clavus to the submarginal area, where it more or less encloses some pale spots, at the apex three distinct black spots; wings pale creamy white, the veins pale fuscous.

Long., excl. tegm., 3½ mm.; exp. tegm. 12 mm.

*Hab.* Bengal; Chapra (*Mackenzie*). Pusa (found on grass).

*Chaprina vittata*, sp. n.

Body and legs stramineous; vertex and pronotum greyish white; tegmina creamy white, with irregular ochraceous markings, these are irregular, maculate, and consist of an elongate spot occupying nearly basal half of clavus, another at and rising above claval apex, two in radial area (one at base, the other at apex), one at end of cell beyond radial area, two, almost united, beneath the base of this cell, and some marginal irregular spots of the same colour, a few small dark spots on disk, and at the apex two short dark longitudinal vittæ, with a small dark spot above and below them; wings pale creamy white.

Long., excl. tegm., 3 mm.; exp. tegm. 10–11 mm.

*Hab.* Bengal; Chapra (*Mackenzie*). Ceylon; Hakgala (*Green*).

Tapoosa, gen. nov.

Vertex of head projecting beyond the eyes, with a short acute spine on each side at apex, recurved, narrow, the lateral margins ridged, angularly widened between the eyes; face long, narrow, behind the eyes widened outwardly and then inwardly to clypeus, which is very short; antennæ inserted beneath the eyes, second joint moderately short and thick; pronotum short, angularly directed anteriorly, lateral margins not foliaceous; mesonotum broad, tricarinate; legs long and slender; tegmina somewhat narrow, their apices subangularly rounded, apical areas numerous, short, ill-defined, and continued round apices of costal and inner margins, an irregular series of transverse and discontinuous veins beyond middle, costal area broad; wings a little shorter and broader than tegmina.

Allied to *Kamendaka*, Dist. The Australian genus *Makula*, Dist., also belongs to this group of genera.

*Tapoosa maskeliyæ*, sp. n.

Body and legs very pale tawny; mesonotum with the carinations fuscous; two fuscous lines on each side of the laterally compressed head, radiating from eyes to margin; clypeus, disk of sternum, and femora black; tegmina subhyaline, talc-like, apical veins more or less sanguineous, apical areas with fuscous streaks, the whole remaining disk suffused with pale fuscous, excluding some pale spots on costal area, basal area, and clavus; wings pale hyaline, with an opaline lustre, the veins on costal area fuscous.

Long., excl. tegm., 3½ mm.; exp. tegm. 13 mm.

*Hab.* Ceylon; Maskeliya (*Green*).

*Tapoosa maculosa*, sp. n.

Head very pale ochraceous; pronotum greyish white; mesonotum pale ochraceous; abdomen above and body beneath and legs pale ochraceous; tegmina pale creamy white, the veins and scattered suffusions pale ochraceous, a small spot near middle of costal membrane, another at base of radial area, a series on inner margin, and some still smaller spots on apical margin fuscous or piceous; wings pale creamy white; a central ridge and the apex to abdomen above

distinctly paler; face a little less dilated than in *maskeliya* and *elegantula*.

Long., excl. tegm., 3 mm.; exp. tegm. 13 mm.

*Hab.* Ceylon; Maskeliya.

*Tapoosa elegantula*, sp. n.

Head creamy white, central base foveately ochraceous, lateral margins of the face greyish white, with transverse fuscous lines; pro- and mesonota ochraceous, the former with a sublateral black fascia behind eyes, the latter with the margins more or less irregularly black; abdomen above and body beneath and legs pale ochraceous; tegmina creamy white, a black spot near middle of costal membrane, the remainder of this area to near apex dull ochraceous, with a minute black spot beyond middle of costal margin, the apex creamy white with minute black spots, and with a short, broad, central, sanguineous, fasciate spot containing two small rounded and two linear black spots; beneath radial area are two ochraceous spots margined with fuscous, the first basal, the second near middle, and beyond the latter on posterior marginal area a series of waved blackish lines; wings creamy white; abdomen strongly constricted before apex.

Long., excl. tegm., 2½ mm.; exp. tegm. 10 mm.

*Hab.* Ceylon; Peradeniya (*Green*).

From fronds of palm-trees (*E. E. Green*).

PHRA, gen. nov.

Vertex of head moderately broad and triangular, distinctly projecting in front of eyes, the lateral margins strongly ridged; face very long and narrow, broadest at base, lateral margins strongly ridged; clypeus short, broad, obscurely ridged; antennæ inserted beneath eyes, short, robust; pronotum short, subtriangularly produced anteriorly, the lateral areas acutely foliaceous; mesonotum broad and long; legs long and slender; tegmina widening towards apices, which are subtruncate, costal area broad, with two or three indistinct transverse veins beyond middle, apical areas numerous, short, extending from posterior angle of inner margin to apex of costal margin, only one subapical series of transverse veins; wings about two-thirds of the length of tegmina, four discal transverse veins beyond middle.

*Phra* in the Indian fauna must be placed near *Kamendaka*. It is more closely allied to the Australian genus *Fenuahala*, Dist.

*Phra amplificata*, sp. n.

Head, pronotum, body beneath, and legs pale ochraceous; eyes black, with golden iridescence; mesonotum with four castaneous fasciæ, two central and contiguous and one near each lateral margin; tegmina subhyaline, talc-like, pale fuscous streaks on costal and apical areas, many of the discal veins suffused with fuscous and more prominent suffusions on radial area and on inner margin; wings hyaline, with an opalescent lustre, the veins a little darker.

Long., excl. tegm., 3–4 mm.; exp. tegm. 17–18 mm.

*Hab.* Ceylon; Maskeliya (*Green*).

*Phra atromaculata*, sp. n.

Body above, head beneath, sternum, and legs dull brownish ochraceous, the abdomen with the posterior segmental margins greyish white; abdomen beneath dull stramineous, with lateral marginal fuscous spots and the posterior segmental margins greyish white; tegmina dull greyish white, talc-like, the veins prominent and beyond basal area paler and more creamy white in colour, with small scattered black spots, two in posterior half of costal membrane, two in radial area, one beneath radial area, and another (larger) near claval apex, on apical half of disk, three or four spots arranged longitudinally; wings creamy white.

Long., excl. tegm., 4 mm.; exp. tegm. 13 mm.

*Hab.* N.W. India.

Archa, gen. nov.

Vertex of head long and narrow, projecting considerably beyond eyes, moderately widened posteriorly, notched at apex, the lateral margins strongly ridged; face long and narrow, the lateral margins ridged, a little ampliated before clypeus, which is centrally ridged and much shorter than face; antennæ inserted just before base of clypeus, long, second joint very robust; rostrum reaching the posterior coxæ, apical joint of moderate length; legs moderately long and slender; pronotum short, angularly sinuate, its lateral margins foliaceously produced, its posterior margin ridged; mesonotum long, somewhat obscurely tricarinate; tegmina narrow at base, broadened towards apices, apical areas numerous, short, extending from posterior angle of inner margin to apex of costal margin, costal area wide, without transverse veins, costal margin sinuate a little beyond base.

By the strongly developed antennæ *Archa*, in this fauna,

is allied to *Vinata* and *Devadanda*, and by the structure of the antennæ more to *Vinata*; the position of their insertion, the structure of the face, and the single series of transverse veins to the apical areas of the tegmina will, however, prevent any confusion. It is more nearly allied to the Australian genus *Kuranda*, Dist.

*Archa typica*, sp. n.

Head, pronotum, and mesonotum ochraceous; a lateral fascia on each side of mesonotum black; central area of face, eyes, and antennæ black; sternum and legs piceous; abdomen beneath with the posterior segmental margins sanguineous and basally suffused with piceous; tegmina cretaceous white, near middle crossed by a broken transverse black fascia.

Long., incl. tegm., 8 mm.

*Hab.* Ceylon; Peradeniya (*Green*).

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## LXXI.—*On the Upper Devonian Ostracoderm*, Psammosteus taylori. By A. Smith Woodward, LL.D., F.R.S.

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[Plate IX.]

In 1892, when studying Devonian fishes in the University Museum of Dorpat, I observed a large, ovoid, convex dermal plate exhibiting the characteristic texture and ornament of *Psammosteus paradoxus* *. On returning to London I identified a rough papier-maché copy of this plate which had been presented to the British Museum by Sir Roderick Murchison in 1842, but had not previously been determined †. Some time afterwards Mr. William Taylor discovered in the Upper Old Red Sandstone of Newton Quarry, Elgin, a nearly similar plate, which he presented to the Royal Scottish Museum; and the close resemblance of this plate to the Russian specimen was soon recognized by Dr. Traquair when he examined the British Museum cast for comparison.

* L. Agassiz, Poiss. Foss. V. G. R. (1845) p. 104, pl. B, figs. 5, 6, pl. xxvii. figs. 2–4.

† A. S. Woodward, "The Problem of the Primæval Sharks," Nat. Science, vol. vi. (1894) p. 38, fig. 1.

Dr. Traquair referred the Elgin fossil to the genus *Psammosteus*, but described it as the type of a new species, *P. taylori*, firstly on account of its shape *, and then on account of its external ornament †. The subsequent discovery of nearly complete specimens of *Drepanaspis* in the Lower Devonian of Germany suggested that the ovoid plate of *Psammosteus* was the median dorsal of a closely allied fish ‡; and it became clear that Dr. Traquair was correct in referring this fossil to the Heterostracous section of the Ostracodermi.

Several more or less nearly perfect examples of the dorsal plate of *P. taylori* are now known, and Mr. Taylor has lately offered to the British Museum a new specimen which shows the same plate in natural association with other parts of the dermal armour. Though much fractured this fossil adds considerably to our knowledge of the genus and species to which it belongs, and it proves definitely that *Psammosteus* and *Drepanaspis* are distinct genera.

An inner or lower view of the dorsal shield of the new specimen, with the left border added from the counterpart, is given in Pl. IX. fig. 1. It has been somewhat obliquely distorted by crushing, but in general shape it agrees with the type specimen described by Traquair. Sufficient of the border is preserved to show that the plate is narrowest at the anterior end, where it is excavated in front by a re-entering angle. It is widest at about its middle, where there seems to be a little bulging outwards in a triangular expansion on each side. Its posterior end, so far as shown, is gently rounded. Its inner face is remarkably smooth, though marked in places with the irregular pustules which are so characteristic of the inner face in plates of *Psammosteus*. Its outer face is scarcely seen, but one fragment seems to show in an abraded state the tessellated ornament described by Traquair.

On either side of the median dorsal plate a flat triangular spine occurs just in front of the widest point. These spines (*s.*) point backwards and are identical in shape with Russian

* R. H. Traquair, "On *Psammosteus taylori*, a new Fossil Fish from the Upper Old Red Sandstone of Morayshire," Ann. Scott. Nat. Hist. vol. iii. (1894) p. 225, with fig.; also "The Extinct Vertebrata of the Moray Firth Area," in Brown and Buckley's Vert. Fauna Moray Basin, (1896) p. 260, pl. vi. figs. 1–3.

† R. H. Traquair, "Additional Notes on the Fossil Fishes of the Upper Old Red Sandstone of the Moray Firth Area," Proc. Roy. Phys. Soc. Edinb. vol. xiii. (1897) p. 378, pl. xi. fig. 5.

‡ R. H. Traquair, "Report on Fossil Fishes . . . . from the Silurian Rocks of the South of Scotland," Trans. Roy. Soc. Edinb. vol. xxxix. (1899) p. 848.

specimens which have already been referred to *Psammosteus* on account of their external ornament *. They are flattened probably in a horizontal plane, and, so far as preserved, they are solid, though with comparatively open tissue in their middle layer. At the broad base their tissue has a longitudinally fibrous aspect, while the blunt posterior apex (fig. 3), which tends to be falcate in shape, is ornamented on both flat faces by crowded large stellate tubercles, which are smooth at the summit. The outer border of the apical extremity is smooth, and appearances suggest that this condition is due to wear during life.

The mode of insertion and attachment of the paired lateral spines is uncertain, but their bases are partly obscured by an obviously flexible mosaic of irregular polygonal tesseræ, which are very thin in comparison with the median dorsal plate. All these tesseræ consist of stellate tubercles fused together, without any added basal layer, and some of those underlying the base of the spine on the right side of the fossil (fig. 5) exhibit the relatively large tubercle near the centre, which has already been mentioned by Traquair as characteristic of the ornament of the dorsal plate of *P. taylori*.

Owing to imperfections in the fossil, the extent of this covering of polygonal tesseræ on the sides of the fish between the dorsal and ventral plates cannot be determined; but on the left side the region bordering the anterior half of the dorsal plate is invested with large stellate tubercles, with smooth (perhaps abraded) apices, which appear to have been all separate, and are certainly not fused into groups (fig. 4). These form a layer as thin as the polygonal tesseræ, and they are seen to cover the lateral border of the fish, without any marginal plates.

By a fortunate fracture of the rock the left side of the median ventral plate is exposed from within (fig. 2). This plate (*v.*) is smaller, thinner, and much less convex than the median dorsal, apparently ovoid in shape, and somewhat longer than broad. Its inner face bears some very prominent irregularly arranged pustules (fig. 6). Its outer face is scarcely seen, but one fragment of the antero-lateral portion exhibits flat-topped, large, stellate tubercles, all closely arranged and not in tesseræ.

In the region of the head, just in front of the median dorsal plate, there are also traces of dermal armour, but these are too imperfect for their nature to be determined. A mass of

* A. S. Woodward, Catal. Foss. Fishes Brit. Mus. pt. ii. (1891) p. 126.

calcified tissue (fig. 1, *x*) lying in the anterior angle of the median dorsal plate appears to be merely a displaced fragment.

Of the tail nothing is preserved.

From this description of the new specimen it is evident that *Psammosteus* differs from *Drepanaspis* at least in the flexibility of the lateral armour between the median dorsal and ventral plates. It is possible also that the so-called lateral spines of *Psammosteus* may be movable appendages, not homologous with any plates in *Drepanaspis*. The two genera are therefore easily distinguishable; but it would be well to await the discovery of the head and tail of the Upper Devonian fish before deciding whether or not to assign it to a separate family.

## EXPLANATION OF PLATE IX.

*Psammosteus taylori*, Traquair; dorsal and ventral shields, with appendages.—Upper Old Red Sandstone; Newton Quarry, Elgin. [William Taylor Collection, Brit. Mus. no. P. 10956.]

*Fig.* 1. Inner view of dorsal plate, with left side added from counterpart, one-quarter nat. size. *s.*, lateral spines; *x*, displaced fragment of bone.

*Fig.* 2. Dorsal view of mould of fossil, to show ventral plate in position, one-quarter nat. size. *d.*, internal mould of dorsal plate; *v.*, inner face of ventral plate.

*Fig.* 3. Apex of left paired spine, enlarged by one-half, to show ornament and worn border.

*Fig.* 4. Small stellate tubercles of lateral region, enlarged by one-half.

*Fig.* 5. Tesseræ of infero-lateral region, enlarged by one-half.

*Fig.* 6. Inner face of ventral plate, showing pustules, nat. size.

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## LXXII.—*On new Mammals from East Africa, presented to the British Museum by Mr. A. Blaney Percival.* By Guy Dollman.

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The following paper deals with some of the new mammals contained in the large collection recently made by Mr. A. Blaney Percival in East Africa. The greater part of the collection has yet to be worked out, when a complete list of all the specimens will be published.

### *Elephantulus delicatus*, Dollm.

♂. 435, 436; ♀. 424.

A long-tailed species very similar in colour to *E. somalicus*, Thos., but with longer nasals and palate.

Size about as in *somalicus*, tail averaging about 140 mm. in length. Fur thick and long. General colour of dorsal surface very like that of *somalicus*, rather more buffy and without the greyish wash present in the Somali species. Flanks purer and yellower in colour. Head rather lighter, especially on the frontal region. Backs of hands and feet white. Underparts white, hairs almost white to roots, the extreme bases of the hairs alone being greyish ; in *somalicus* the entire basal halves of the hairs are slate-black, giving the belly a greyish appearance. Tail as in *somalicus*.

Skull rather large, with long nasal and palatal regions.

Dimensions of the type (measured in the flesh) :—

Head and body 126 mm. ; tail 145 ; hind foot 34·5 ; ear 25.

Skull : greatest length 37 ; condylo-incisive length 34·2 ; zygomatic breadth 20·5 ; interorbital constriction 6 ; squamosal breadth across brain-case 16 ; greatest length of nasals 15 ; palatilar length 19·5 ; length of upper tooth-row from front of first incisor to back of last molar 18·9.

*Hab.* Orr Valley, Mt. Nyiro. Altitude 3500 feet.

*Type.* Old male. Original number 435. Collected on April 3rd, 1911.

The almost pure white hair on the ventral surface of the body readily distinguishes this new form from the Somali species, while the cranial differences, noted above, appear of specific value.

*Paraxerus percivali*, sp. n.

♂. B, D, 252, 263, 280 ; ♀. 253, 258, 266, 267, 271, 317. Marsabit.

Related to *jacksoni*, de Wint., but smaller in size and with dorsal surface of body dark blackish olive in colour.

Skin dimensions rather less than in *jacksoni*. General colour of back yellowish olive, with a dark blackish suffusion down the middle of the body, extending from the top of the head to the rump and spreading on to the tail. Flanks and shoulders brownish olive speckled with yellowish white ; light side stripes faintly defined. Forehead blackish speckled with yellow ; sides of face, muzzle, and ocular markings dingy greyish buff. Backs of hands and feet yellowish buff, in this respect resembling *jacksoni capitis*, Thos. Ventral surface of body very much as in *jacksoni*, the buff tint a trifle richer and the grey bases to the hairs not quite so evident. Tail rather blacker throughout ; subterminal rings on hairs pale yellowish buff.

Skull like that of *jacksoni*, but smaller, with shorter nasals and smaller cheek-teeth. Auditory bullæ less inflated.

Dimensions of the type (measured in the flesh) :—

Head and body 155 mm.; tail 160; hind foot 36; ear 18.

Skull: greatest length 40·5; condylo-incisive length 36; zygomatic breadth 23·5; interorbital constriction 11; squamosal breadth of brain-case 18; length of nasals 10·3; greatest width across nasals 6·5; palatilar length 15·8; length of upper tooth-row 7.

*Hab.* Marsabit. Altitude 4500 feet.

*Type.* Adult female. Original number 253. Collected on February 16th, 1911.

The affinities of this species are not easy to decide; it seems to be rather intermediate between the *jacksoni* and *ochraceus* groups. From *jacksoni* it is distinguished by its rather smaller size and the dark blackish suffusion on the dorsal surface.

The very much darker colour of the fur is sufficient to separate this species from all the forms of *ochraceus*. *Paraxerus kahari*, recently described by Heller from Meru Boma, appears to be related to this new Marsabit species, from which it is distinguished by its larger size and more buffy coloration.

*Paraxerus ochraceus augustus*, subsp. n.

♂. C, 264, 279; ♀. A, 265, 316. Marsabit.

A pale yellow-coloured form allied to *P. ochraceus*, Huet.

Size as in *aruscensis*. General colour of dorsal surface pale yellowish buff grizzled with brown and grey, the brown tint most conspicuous on the hinder part of the back. Light lateral stripes almost entirely invisible. Shoulders pale yellowish buff; flanks pale greyish buff, faintly speckled with brownish grey. Top of head similar in colour to back, general effect greyish olive. Muzzle and sides of face white, washed with pale buff. Eyes with narrow white lines above and broad white markings below.

Backs of hands and feet yellowish buff, paler than in *ochraceus*. Under surface of body creamy white. Tail as in *ochraceus*.

Skull larger than in *ochraceus*, nearly equal in size to that of *aruscensis*.

Dimensions of the type (measured in the flesh) :—

Head and body 150 mm.; tail 160; hind foot 38; ear 19.

Skull: greatest length 40·2; condylo-incisive length 36;

zygomatic breadth 22·7; interorbital constriction 11·4; squamosal breadth of brain-case 18; length of nasals 10·5; greatest breadth across nasals 6; palatilar length 15·7; length of upper tooth-row 7·2.

*Hab.* Marsabit. Altitude 4500 feet.

*Type.* Adult male. Original number C. Collected January 1st, 1911.

This Marsabit race is readily recognized by the pale yellowish olive-coloured dorsal surface, light-coloured face, and yellowish-buff feet.

*Paraxerus ochraceus animosus*, subsp. n.

♂. 386, 387; ♀. 409, 411, 449. Mt. Nyiro.

An exceedingly pale-coloured race related to *P. ochraceus electus*, Thos.

Size about as in the foregoing form. General colour far paler and whiter than in any of the allied species; dorsal surface light greyish olive speckled with black and pale yellowish white, the general effect very much lighter in colour than in *electus* or *augustus*. Flanks pale olive-grey, faintly speckled with light brownish black. Side stripes invisible. Back of head and forehead similar in colour to rest of dorsal surface. White stripes above and below the eyes wide and well defined. Sides of face creamy white; lateral cheek-stripe very much fainter and less conspicuous than in *electus* or the allied races. Backs of hands and feet creamy white, hairs with the dark blackish bases and light tips. Under surface of body white, many of the hairs on the belly with grey bases and white tips. Tail much as in *electus* but paler throughout.

Skull similar to that of *Paraxerus ochraceus augustus*.

Dimensions of the type (measured in the flesh) :—

Head and body 150 mm.; tail 156; hind foot 38·5; ear 20.

Skull: greatest length 39·5; condylo-incisive length 36; zygomatic breadth 22·5; interorbital constriction 10·9; squamosal breadth of brain-case 17; length of nasals 10·8; greatest width across nasals 5·3; palatilar length 15·8; length of upper tooth-row 7·2.

*Hab.* Mt. Nyiro. Altitude 6000 feet.

*Type.* Adult female. Original number 449. Collected on April 6th, 1911.

The light greyish-white appearance of this race at once distinguishes it from all the allied forms of the *ochraceus* group.

*Taterillus nubilus*, sp. n.

♂. 411, 412. Orr Valley, Mt. Nyiro.

♂. 495. Hot springs.

Allied to *T. osgoodi*, Wrought., but less rufous in colour and with a smaller skull.

General proportions much as in *osgoodi*. Dorsal surface yellowish buff finely speckled with greyish brown, the general effect rather similar to that of *T. tenebricus*, Dollm., but very much paler; no trace of the bright rufous colouring met with in *osgoodi*. Flanks rather purer and richer in colour, the dark speckling much less evident than on the back. Face and head as in *tenebricus*, but dark frontal marking less black and light cheeks rather more buffy. Backs of hands and feet and entire underparts white. Tail as in *osgoodi*.

Skull smaller than in the Voi species, with smaller auditory bullæ and molar teeth.

Dimensions of the type (measured from dry skin *):—

Head and body 112 mm.; tail 150; hind foot 29.

Skull: greatest length 35·4; basal length 28; condylo-incisive length 30; zygomatic breadth 17·7; interorbital breadth 6·4; breadth of brain-case (across squamosal region) 15·2; length of nasals 14; palatal length 17·2; length of palatal foramina 5·8; length of upper molar series 4·5; alveolar length of upper molar series 5·1.

*Hab.* Orr Valley, Mt. Nyiro. Altitude 3500 feet.

*Type.* Old male. Original number 412. Collected in March 1911.

The much duller and less rufous colouring at once distinguishes this gerbil from the Voi species, in which the dorsal surface is bright buffy rufous. From *T. tenebricus* this new form is distinguished by its larger size, lighter colour, and very much larger and heavier skull.

*Taterillus nubilus illustris*, subsp. n.

♂. 224, 326; ♀. 325. 12 miles N. of the Eusso Nyiro.

A pale-coloured race allied to the foregoing species.

In size and general proportions much as in *nubilus*. General colour of dorsal surface pale straw-tinted buff, the buff colour most evident on the hind-quarters and posterior back; dark speckling very faint, the general effect resembling a pale-coloured *T. osgoodi*. Flanks pale buff.

* Dimensions of another specimen measured in the flesh: head and body 115 mm.; tail 153; hind foot 32; ear 27.

Head and face-markings much less evident than in *nubilus*, dark stripe on forehead and muzzle scarcely defined ; ocular rings and dark area behind eyes almost invisible. Outer surface of ears clothed with orange-buff hairs. Backs of hands and feet and ventral surface of body white. Tail as in *nubilus*.

Skull quite as in *nubilus*, molar teeth a trifle smaller.

Dimensions of the type (measured in the flesh) :—

Head and body 108 mm.; tail 158; hind foot 29 ; ear 19.

Skull: greatest length 35 ; basal length 28; condylo-incisive length 30 ; zygomatic breadth 18 ; interorbital constriction 7 ; squamosal breadth of brain-case 15·3 ; length of nasals 14; palatal length 17 ; length of palatal foramina 5·8 ; length of upper cheek-teeth 4·6; alveolar length of upper cheek-teeth 5·2.

*Hab.* 12 miles north of the Eusso Nyiro. Altitude 3300 feet.

*Type.* Adult male. Original number 326. Collected on February 2nd, 1911.

*Thamnomys surdaster lutosus*, subsp. n.

♂. 397, 401, 403, 404 ; ♀. 398, 399, 400, 402, 439. Mt. Nyiro. Altitude 8000 feet.

About equal in size to *T. surdaster ibeanus*, Osg., but much paler in colour.

Size of body and hind feet as in *ibeanus*, tail rather longer. General colour very much that of *T. s. polionops*, Osg., but less rufous on dorsal surface and without dusky markings on sides of face. Colour of back paler and less buffy than in *T. s. insignis*, the rufous tint only asserting itself on the hind-quarters and rump. Flanks pale slate-grey tinted with yellowish buff, a good deal paler than in either *insignis* or *ibeanus*. Face and head grey, tinted with pale yellowish buff. In the coloration of the flanks and head this form most nearly resembles *polionops*. Underparts creamy white, hairs white to roots. Backs of hands and feet yellowish white. Tail long, in colour and distribution of hair about as in the allied races.

Skull a trifle shorter and stouter than in either *ibeanus* or *insignis*.

Dimensions of the type (measured in the flesh) :—

Head and body 118 mm.; tail 198; hind foot 24 ; ear 22.

Skull: greatest length 31·4 ; basilar length 24·5; con-

dylo-incisive length 28·5; zygomatic breadth 15·4; squamosal breadth of brain-case 13·7; interorbital constriction 4·7; length of nasals 12; palatilar length 13·5; length of palatal foramina 6·8; length of upper molar series 4·8.

This race is evidently closely allied to both *ibeanus* and *insignis*, from both of which it is distinguished by its paler colour.

I take this opportunity of describing a further new species of *Thamnomys*, recently collected by Mr. Robin Kemp in the Lake Kivu District.

*Thamnomys kempi*, sp. n.

Allied to *T. venustus*, Thos., but considerably larger in size and with very much larger molar teeth.

Size of body greater than in any other known member of the genus. Fur of back long, as in *venustus*. General colour of dorsal surface bright orange-rufous, the reddish tint most marked on the posterior back and hind-quarters, much as in *Thamnomys dryas*. Hairs on posterior part of back slate-black with short reddish tips; interspersed are a number of dark brownish hairs, which are most numerous on the anterior portion of the body. Hairs on shoulders and neck slate-black with yellowish-buff tips. Flanks slaty grey washed with bright yellowish buff. Face and head greyish buff; tip of nose black. Ears clothed on the outside with dark brownish hairs; inner side closely covered with short golden-buff hairs. Backs of hands and feet buff-coloured, with conspicuous dark patches on the metacarpal and metatarsal areas. Underparts pale buff, the hairs all with slate-grey bases and long buff-coloured tips. Tail very long, pencilled terminally; uniformly dark brown in colour.

Skull larger than that of *venustus*, with longer nasals and palatal foramina, more inflated auditory bullæ, and much larger and heavier molars.

Dimensions of the type (measured in the flesh):—

Head and body 141 mm.; tail 189; hind foot 27·5; ear 22·5.

Skull: greatest length 36; basilar length 27·2; condylo-incisive length 32; zygomatic breadth 16·4; interorbital constriction 4·7; greatest breadth of brain-case 14·6; length of nasals 14·8; palatilar length 15; length of palatal foramina 8·8; length of upper molar series 7.

*Hab.* Buhamba, near Lake Kivu, Congo Belge. Altitude 6000 feet.

*Type.* Adult female. Original number 2188. Collected on June 3rd, 1911.

This *Thamnomys* is undoubtedly related to the large Ruwenzori species, *T. venustus*, from which it is distinguished by its greater size and far larger molar teeth.

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## LXXIII.—*A new Pœciliid Fish from the Amazon, with Notes on the Genera* Petalosoma *and* Tomeurus. By C. Tate Regan, M.A.

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In 1908 (Ann. & Mag. Nat. Hist. (8) ii. p. 458) I described a Pœciliid fish from Costa Rica under the name *Petalosoma cultratum*; this differed from all other Pœciliids then known in having the tail behind the anal fin compressed to a sharp ventral edge formed of paired scales. In the following year Eigenmann (Ann. Carnegie Mus. vi. p. 53) published the description of *Tomeurus gracilis* from British Guiana, another Pœciliid fish with this peculiarity. I have now received from Herr A. Rachow, of Hamburg, examples of a new species of *Petalosoma* from the Amazon at Obidos.

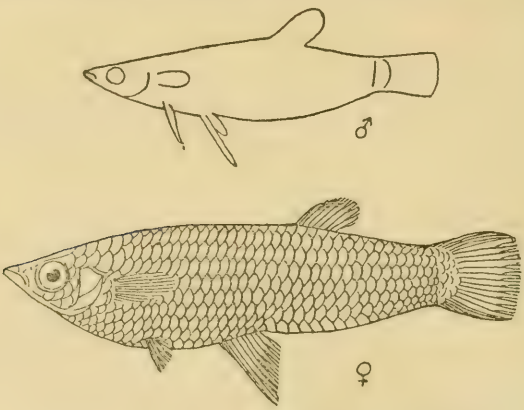
*Petalosoma* and *Tomeurus* resemble *Gambusia* in mouth-structure, dentition, &c., and in having the anal fin of the male advanced and modified into an intromittent organ. In *Petalosoma* the body is moderately deep (depth 3 to 4 in the length); the anal fin of the male is inserted below or a little behind the end of the pectoral, is rather short ($\frac{1}{4}$ to $\frac{1}{5}$ the length of the fish), and has the elongate rays simple; the pelvic fins are well developed, inserted below the middle of the pectoral, larger in the male than in the female. In *Tomeurus* (*fide* Eigenmann) the body is long and slender (depth $6\frac{1}{2}$ in the length), the anal fin of the male is inserted below the base of the pectoral, is very long ($\frac{1}{3}$ the length of the fish), and has the first elongate ray armed with spiniferous appendages, whilst the pelvic fins in the male are minute, below the gill-openings, and in the female absent.

The new species may be designated

*Petalosoma amazonum*, sp. n.

Body moderately compressed, its depth $3\frac{2}{3}$ in the length; length of head $4\frac{1}{2}$. Snout as long as eye, the diameter of which is 3 in the length of head and less than the interorbital

width. 33 or 34 scales in a longitudinal series. Dorsal 8 or 9; origin equidistant from anterior (♂) or posterior (♀) margin of eye and posterior edge of caudal fin; fin more elevated in the male than in the female, but not nearly reaching the caudal when laid back; distance from dorsal to




*Petalosoma amazonum*, ♂ and ♀, enlarged to 1½.

caudal twice or nearly twice the least depth of the caudal peduncle. Anal 10, in the female nearly in the middle of the length of the fish, in the male originating a little behind the end of the pectoral, which is shorter than the head. Pelvics 6-rayed, inserted below the middle of the pectoral. Caudal subtruncate. Coloration olivaceous.

Two specimens, a male of 35 and a female of 51 mm., from Obidos.

*Petalosoma cultratum* differs from this species especially in the deeper and more strongly compressed body and more posterior dorsal fin. In the type, a male of 50 mm., the depth of the body is 3⅓ in the length, the dorsal, when laid back, nearly reaches the caudal, and the distance between these fins is equal to the least depth of the caudal peduncle.

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## LXXIV.—*Descriptions and Records of Bees.*—XXXIX.

By T. D. A. Cockerell, University of Colorado.

### *Halictus provancheri*, Dalla Torre.

Comparing specimens from Woods Hole and Cuttyhunk Island, Massachusetts, with those collected by Robertson in

Illinois, I find that the Atlantic coast form has evidently dusky wings, while that from Illinois has them very clear, with a light amber stigma. The first of these is the true *provancheri*; the second may be regarded as a subspecies, *H. provancheri nearcticus* (Vachal). Vachal in describing *nearcticus* does not mention the colour of the wings, but he compares it with *H. agilis*, of which he has just said "aile hyaline à nervures jaunes"; and as he cites specimens from Illinois, I will designate this as the type locality. It is only with difficulty that this species can be separated from the European *H. tumulorum* (L.), the principal characters being the more or less reddish or testaceous trochanters of the male.

*Halictus albipennis,* Robertson.

Males; Woods Hole, Mass. (*Eleth Cattell*).

*Halictus arcuatus gulosus*, subsp. n.

♀.—Length about 8½ mm., anterior wing 7.

Very robust, the abdomen very broad at base. Compared with *H. arcuatus,* Rob. (Illinois specimen received from Robertson), it is much larger, with darker tegulæ and wings. The apical truncation of the metathorax is well defined, but the insect cannot be confused with *H. truncatus,* Rob., on account of the almost simple hind spurs and the distinctly though sparsely punctured first abdominal segment. It is separated from *H. discus,* Smith, by the absence of distinct impunctate areas on scutellum, the large stigma and the minutely punctured abdomen. From *H. arcuatus parisus,* Lovell, it is known by the very distinct though linear testaceous hind margins of the abdominal segments and the coarser rugæ of the metathoracic enclosure.

*Hab.* Woods Hole, Massachusetts, July 1911 (*Cockerell*).

It seems probable that there are several closely allied species related to *arcuatus,* but until we know more about them, it will do no harm to treat *parisus* and *gulosus* as subspecies only. *H. crassus,* Vachal, appears to be a synonym of *arcuatus.*

*Halictus bardus,* Cresson.

South Fork of Eagle Creek, New Mexico, at flowers of *Sicyos parviflora,* Willd., prox. 8000 ft., Aug. 18 (*C. H. T. Townsend*).

*Halictus cooleyi*, Crawford.

Top of ridge, Rio Ruidoso, New Mexico, at flowers of *Solidago trinervata*, Greene, prox. 7600 ft., Aug. 2 (*C. H. T. Townsend*). New to New Mexico.

*Halictus horishensis*, sp. n.

♂.—Length nearly 9 mm., anterior wings 6 mm.

Black, with elongate parallel-sided abdomen, which is $2\frac{1}{3}$ mm. wide; head ordinary, somewhat longer than broad, the occipital region elevated; hair of head and thorax pale yellowish grey, long and light ochreous on scutellums; vertex shining, front minutely rugose; clypeus with a yellowish-white transverse subapical band, not reaching sides; labrum black; mandibles strongly elbowed, ferruginous beyond the middle; cheeks rounded; antennæ long, black, the flagellum with a very faint coffee-brown tint beneath. Mesothorax shining, but strongly and densely punctured, not tessellate between the punctures; tegulæ ferruginous clouded with fuscous, apparently impunctate, though some minute discal punctures can be seen with the compound microscope; scutellum sculptured like metathorax; pleura with the punctures running into transverse grooves; area of metathorax well-defined, pointed behind, shining, with strong oblique rugæ. Wings dusky, stigma and nervures red-brown; outer nervures distinct; second s.m. small and narrow, less than half the size of third, receiving first r. n. very close to end; third s.m. of the subquadrate type. Legs black with pale hair, the tarsi black, with only the apex of the last joint ferruginous; abdomen shining, minutely but distinctly punctured; hind margins of segments dark; no apical hair-bands, but bases of segments with broad uniform greyish-white shaggy hair-bands.

*Hab.* Horisha, Formosa (*T. Fukai*). U.S. National Museum.

Among the species described from Formosa this can only be compared with *H. formosæ*, Strand, from which it differs by the narrower, parallel-sided abdomen, the yellowish-white spurs, the basal bands of abdomen not narrowed medially, &c. In Bingham's table of Indian species it runs exactly to *H. dasygaster*, Vachal, of which only the female is known; but *horishensis* appears to differ sufficiently by the greyish-white abdominal bands, dusky wings, and smaller second submarginal cell. Among the European species it quite closely resembles *H. sexnotatus*, but is easily separated by

the coarser, oblique rugæ at base of metathorax, and the broad entire hair-bands of the narrower abdomen. It is structurally closer to *H. leucozonius*, from which it is at once known by the dark basitarsi. In the North American fauna it may be compared with *H. trizonatus*, from which it differs by the much more closely punctured mesothorax and the much stronger rugæ of basal area of metathorax. *H. horishensis* is not represented in the Sauter collection from Formosa.

The following table separates the females of four Formosan species of *Halictus*, and contrasts them with a number of forms which they more or less closely resemble:—

| | | |
|---|---|---|
| | Sides of prothorax above much enlarged, concave, produced to an acute angle; mesothorax with very strong well-separated punctures; abdomen closely, very minutely punctured. (Formosa.) ..... | *perangulatus*, Ckll. |
| | Prothorax normal, or only moderately produced at sides ..... | 1. |
| 1. | Middle and hind tibiæ and tarsi clear ferruginous; basal bands of second and third abdominal segments extremely broad at sides, but narrowed almost or quite to a point in middle; tegulæ bright ferruginous; mesothorax sparsely punctured. (Samarkand.) ..... | *equestris*, Morawitz. |
| | Middle and hind tibiæ and tarsi not thus red (tarsi in *trizonatus* sometimes partly reddened) ..... | 2. |
| 2. | Basal area of metathorax finely granular (finely striate in *manitouellus*); mesothorax very finely punctured ..... | 3. |
| | Basal area of metathorax conspicuously ridged, wrinkled, plicate or striate (finely striate in *manitouellus*) ..... | 5. |
| 3. | Basal bands of abdomen pale fulvous, on second and third segments strongly narrowed in middle; wings dusky greyish. (Colorado.) ..... | *manitouellus*, Ckll. |
| | Basal bands of abdomen cream-colour, not narrowed in middle (except that on second moderately so in *trizonatus*) ..... | 4. |
| 4. | Wings very strongly reddened. (Mexico.) | *schenckii*, Ritsema. |
| | Wings little reddened. (Colorado.)..... | *trizonatus*, Cresson. |
| 5. | Hind margins of abdominal segments ferruginous or pallid. (Europe.) ..... | *calceatus* (Scop.). |
| | Hind margins of abdominal segments black ..... | 6. |
| 6. | Bands at bases of second and third abdominal segments much narrowed in middle, or interrupted, and always yellowish-tinted or fulvous ..... | 7. |

| | | |
|---|---|---|
| | Bands at bases of second and third segments entire, and usually white ..... | 9. |
| 7. | Mesothorax densely punctured all over .. | *manitouellus*, Ckll. |
| | Mesothorax sparsely punctured, at least on disc ..... | 8. |
| 8. | Anterior part of mesothorax closely punctured. (Washington State.) ..... | *pacificus*, Ckll. |
| | Anterior part of mesothorax sparsely punctured. (Formosa.) ..... | *lævidermis*, Ckll. |
| 9. | First abdominal segment with a broad median band of white hair, thin or interrupted in middle. (New Mexico.) .... | *sisymbrii*, Ckll. |
| | First abdominal segment without such a band ..... | 10. |
| 10. | Mesothorax very shiny, with sparse strong punctures ..... | 11. |
| | Mesothorax more densely or very densely punctured ..... | 12. |
| 11. | Larger; first abdominal segment more strongly and clearly punctured. (Tangier.) ..... | *platycestus*, Dours. |
| | Smaller; first abdominal segment with scattered smaller punctures. (Europe).. | *morbillosus*, Kriechb. |
| 12. | Area of metathorax irregularly wrinkled. (Formosa.) ..... | *recognitus*, Ckll. |
| | Area of metathorax distinctly ridged .... | 13. |
| 13. | Area of metathorax with very oblique ridges; mesothorax very finely and densely punctured. (Formosa.)..... | *multistictus*, Ckll. |
| | Area of metathorax with straight ridges; mesothorax with punctures larger and not so dense. (Europe.) ..... | *leucozonius* (Schr.). |

### *Halictus lævidermis*, sp. n.

♀.—Length about 9½ mm., anterior wing 8.

Black, with pale ochraceous pubescence; head broad; antennæ black; mandibles bidentate, black, very obscurely reddish subapically; clypeus very shiny, with strong punctures; front dull and granular (microscopically confluently punctured); mesothorax very shiny, with scattered but distinct punctures, in front gibbous; prothorax broadly angulate on each side in front; disc of scutellum shining, with very few punctures; area of metathorax not distinctly defined, covered with strong irregular rugæ; apical truncation subreticulately sculptured, sharply defined all round; pleura hairy, with a very coarse partly striate sculpture. Legs black, with reddish hair; hair on inner side of hind tibiæ and tarsi shining yellowish; hind spur with numerous minute teeth, not readily noticeable without the microscope; tegulæ shining piceous, the margin pallid in front. Wings dusky; stigma and nervures rufo-fuscous; second s.m. very

broad; nearly as large as third, receiving first r. n. near its end; third s.m. of the quadrate (not elongated) type. Abdomen shining, with numerous very minute punctures; basal bands on segments 2 to 4 pale ochreous-tinted, reduced to triangular lateral patches; apex with pale ochreous hair.

*Hab.* Formosa (*Sauter*). Berlin Museum.

*Halictus recognitus*, sp. n.

♀.—Length about 10 mm., anterior wing 7.

Black, with pale ochreous-tinted pubescence, whiter below, dense and distinctly ochreous on postscutellum; head ordinary, clypeus rather produced, strongly punctured; mandibles dark, obscure red apically; cheeks broad in middle; antennæ dark, flagellum obscurely reddish beneath; front dull and granular, vertex shining; mesothorax shining, but strongly and closely punctured; scutellum densely punctured except on each side of middle; prothorax angulate on each side in front, the angle approximately a right angle; area of metathorax not distinctly defined, very irregularly wrinkled, the sculpture coarse; posterior truncation with sharp margins. Legs black, with pale ochreous hair; hind spur apparently simple, but with very oblique and sharp microscopical denticulations; tegulæ dark rufo-piceous. Wings greyish, stigma and nervures dull testaceous; first r. n. joining second s.m. a short distance before end; third s.m. narrowed above, but not much produced apically. Abdomen rather long and narrow, closely and minutely punctured, except the greater part of the first segment, which is shining with widely separated punctures; basal hair-bands dense, creamy white, entire, their lower edges straight; apical fimbria ochreous, but the surrounding area covered with brown-black hair.

*Hab.* Formosa (*Sauter*). Berlin Museum.

Looks like *H. multistictus*, but easily separated by the paler wings; larger, scattered punctures on first abdominal segment; much smaller basal region (between truncation and postscutellum) of metathorax, &c.

*Halictus multistictus*, sp. n.

♀.—Length about 10½ mm., anterior wing 8.

Black, with short pale reddish pubescence, whiter below; head ordinary, rather broad; clypeus well punctured; antennæ dark; front dull, densely and finely punctured,

vertex hardly shining; mesothorax and scutellum dull, extremely densely and finely punctured; thorax above reddish from short hair; prothorax not angulate at sides in front; base of metathorax large, the poorly defined area with distinct oblique ridges; truncation sharply defined. Legs black, with reddish hair, that on outer side of hind tibiæ and tarsi dark fuscous; hind spur with about five short oblique spines (thus entirely different from that of *H. recognitus*); tegulæ black. Wings dilute fuliginous, stigma rufo-fuscous, nervures dusky testaceous; second s.m. broad, receiving first r. n. a short distance before end, third s.m. of quadrate type. Abdomen shining, but very closely and extremely minutely punctured, including the disc of first segment; basal hair-bands pale ochreous-tinted, entire and with the lower edge straight, but often largely concealed through the overlapping of the segments; hair at apex brownish.

*Hab.* Formosa, 5 ♀ (*Sauter*). Berlin Museum.

Evidently close to *H. horishensis*, but not its female, on account of the much more finely and densely punctured mesothorax, dark tegulæ, &c.

*Halictus perangulatus*, sp. n.

♀.—Length about 10 mm., anterior wing 7⅔.

Black, robust, with broad abdomen; pubescence pale ochreous, lighter below; head ordinary; clypeus strongly punctured; antennæ dark; front dull and granular, vertex shining; mesothorax and scutellum dullish, with very large and strong, not very dense punctures; pleura very hairy; prothorax at sides in front produced into large triangular sharply pointed shelves; area of metathorax with fine more or less sinuous rugæ; truncation sharp-edged at sides. Legs black, with pale ochreous-tinted hair; a brush of bright fox-red hair at end of hind basitarsus; hair on inner side of basitarsi orange; hind spur with about four short blunt laminæ behind, and on inner edge with numerous microscopical appressed teeth (the spur therefore quite different from that of the three species described above, but nearest to *multistictus*, which has pointed teeth in place of the broad blunt laminæ); tegulæ piceous with the margin paler. Wings dusky, stigma and nervures very dull yellowish testaceous; second s.m. broad, receiving first r. n. a short distance from end; third s.m. narrowed about half above, but not much elongated. Abdomen very finely and densely punctured; broad dense pale ochreous-tinted basal hair-

bands entire, their lower edges straight; a very broad hair-band, weak in middle, on first segment toward the base (*H. sisymbrii*-like character); caudal rima ochreous, but with black hair on each side.

*Hab.* Formosa, 7 ♀ (*Sauter*). Berlin Museum.

This may be said to represent in Formosa the Chinese *H. subopacus*, Smith. In the table above, if the prothoracic character is ignored, it runs to *H. sisymbrii*.

*Halictus sidereus*, sp. n.

♀.—Length about 6 mm., anterior wing 4¼.

Black, with very little hair, the abdomen without bands or patches; head ordinary, broad; clypeus shining, with large punctures; flagellum rufescent apically; front and vertex minutely punctured, the latter shining; mesothorax and scutellum microscopically tessellate, with scattered small punctures; parapsidal grooves very distinct; area of metathorax poorly defined, with irregular plicæ, failing apically; posterior truncation not sharp-edged. Legs black, with pale ochreous-tinted hair, the hind tarsi dull ferruginous; hind spur with a few fine sharp teeth; tegulæ shining rufo-testaceous. Wings hyaline, very faintly dusky, the large stigma dark red-brown, nervures sepia, outer nervures moderately weakened; second s.m. broad, third of the quadrate type; first r. n. joining second t.-c. Abdomen broad, shining, very feebly sculptured, the first segment smooth, the second with very minute and indistinct piliferous punctures, the third and fourth microscopically transversely lineolate.

*Hab.* Chip Chip, S. Formosa, Feb. 1909 (*Sauter*). Berlin Museum.

Resembles the Australian *H. blackburni*, Ckll., but the latter has a much broader head, mesothorax duller and much less evidently punctured, &c. From all other female *Halicti* of Formosa it is readily known by its small size, dark stigma, and bandless abdomen. On account of the feeble sculpture of the abdomen it cannot be the female of *H. luteitarsellus*, Strand.

*Halictus statialis*, sp. n.

♀.—Length about 6 mm., anterior wing nearly 4¾.

Black, with rather abundant but thin pale hair, greyish white below, slightly ochreous above; head ordinary, clypeus rather produced, rough and hairy; front dull and granular;

antennæ dark, flagellum ferruginous at end; mesothorax dull, densely punctured on a microscopically tessellate ground; scutellum shining but well punctured; area of metathorax with very fine rather irregular longitudinal rugæ or raised lines; posterior truncation very narrow, well defined. Legs black, with pale hair, the small joints of tarsi somewhat reddish; brush at end of hind basitarsus shining orange; hind spur with a couple of very long blunt branches near the base, and on the apical part a short keel-like lamina; tegulæ rufo-fulvous, darker basally. Wings hyaline, iridescent, nervures and stigma pale testaceous; first r. n. joining second s.m. a considerable distance before end; third t.-c. and second r. n. greatly weakened. Abdomen broad, shining, minutely punctured, with very broad dense pale ochreous-tinted hair-bands at bases of segments 2 to 4, that on the second variably narrowed in middle; a patch of similar hair on each side of first segment; hair of apical segment pale.

*Hab.* Formosa (*Sauter*). Berlin Museum.

The type and another are from Chip Chip, Feb. 1909; a third is simply marked "Formosa." Very close to the Indian *H. nasicensis*, Ckll., but differing in details of sculpture.

*Epeolus peregrinus*, Cockerell.

When describing *E. peregrinus* I neglected to compare it with *E. fervidus*, Smith, also found in India. Mr. G. Meade-Waldo has very kindly compared the types of the two species, and finds the following important differences:—

*E. peregrinus*.—Second s.m. triangular, pointed above; disc of mesothorax more sparingly covered with coarse punctures; ventral surface of thorax covered with a dense silvery pubescence.

*E. fervidus*, Smith.—Second s.m. quadrate, broad above; disc of mesothorax densely and coarsely punctured; ventral surface of thorax black.

*Triepeolus gabrielis*, Cockerell.

Florissant, Colorado, June 1, 1908 (*Cockerell*). Previously known only from California.

*Triepeolus rohweri*, sp. n.

♂.—Length about 9 mm. (abdomen of type contracted). Looking exactly like *T. subalpinus*, Ckll. (♀), but differing as follows: more robust; face densely covered with

silvery-white hair ; mesothorax broadly bordered in front (except in middle) with pale ochreous hair, these bands giving rise at their inner ends to subtriangular but thin and inconspicuous backwardly directed lobes (in *subalpinus* are instead two rather narrow longitudinal bands, and no hair along the front except at extreme sides) ; pleura densely covered with hair, white below, ochreous-tinted above ; scutellum strongly depressed in middle, and axillar teeth larger ; tegulæ brighter red ; black transverse area on first abdominal segment with its edges more or less overlapped by hair, not clean-cut ; apical band of first segment not interrupted. Apical plate of abdomen narrow, dark rufous ; fourth and fifth ventral segments fringed with fuscous hair. Eyes green ; antennæ black, with the third joint red below. Legs red, with the anterior femora black, their tibiæ black in front, middle femora with a suffused black area above; spurs black; second s.m. triangular, narrowed to a point above; band on second abdominal segment with a large rounded lobe on each side.

*Hab.* North Boulder Creek, Boulder County, Colorado, in the Canadian Zone, Aug. 22, 1907 (*S. N. Rohwer*).

I thought at first that this was the male of *T. subalpinus*, but there are too many differences, and I can only suppose that the two are very closely related but distinct species. In Robertson's table of *Triepeolus* (1903), *T. rohweri* runs nearest to *T. helianthi*, from which it differs by the hairy pleura and other characters. As in *helianthi*, the labrum is black.

*Triepeolus pænepectoralis*, Viereck, 1905.

Wawawai, Washington State, both sexes, ♀ Sept. 6, ♂ Aug. 30, 1908 (*W. M. Mann*).

New to the United States, and the male is new. The male is like the female except for the usual sexual differences, and the rather greater development of the light hair. The longitudinal bands on the mesothorax in front reach the anterior margin, the whole of the anterior part of the pleura is covered with hair, and the basal hair-band of the first abdominal segment is not broken. Mr. S. A. Rohwer studied this species somewhat, and noted that it was closely related to *T. subalpinus*. The female is readily separated from *subalpinus* by the larger and broader pygidial area (false pygidium), the upward lateral hair-lobes on second abdominal segment directed inwards so as to make an acute angle with the transverse band (in the manner of *T. pecto-*

*ralis*), the narrower head, &c. The male is known from *T. rohweri* by the much broader pygidial plate, the pleura not all covered with hair, the eyes more parallel, &c.

MELISSINA, gen. nov. (Anthophoridæ.)

Belongs to subfamily *Eucerinæ*, and is the Indian representative of the American genus *Melissodes*, from which it differs by the very short and deep marginal cell, the fourth joint of maxillary palpus long, the less slender paraglossæ, the shorter tongue, and the much less tapering maxillary blade. It differs at once from *Cubitalia*, Friese, which resembles it in the five-jointed maxillary palpi, by the three submarginal cells and long male antennæ (these characters as in *Melissodes*). The following description of the mouth-parts is taken from a female of the type species; the measurements are all in microns:—

Labial palpi 4-jointed, joints measuring (1) 750, (2) 355, (3) 95, (4) 88; apical half of first joint hairy on one side; second joint very broad, very hairy on one side, pale, with two broad brown bands, united by a longitudinal band; last two joints stout; paraglossæ reaching nearly to end of labial palpi; tongue comparatively short, not extending beyond paraglossæ and labial palpi. Maxillary palpi 4-jointed (this also confirmed in male), the joints measuring: (1) 160, (2) 160, (3) 145, (4) 95; first joint very stout, second broadly colourless at apex and less conspicuously so at base; last joint slender, with two bristles at apex, maxillary blade about 1280 long, very broad (about 480) near base.

Tibial scopa of female with plumose bristles, but these have the apical 290 to 320 $\mu$, simple. In the wings the only marked feature is the very broad (deep) marginal cell, which is about as long as the discoidal, and ends rather obtusely far from the costa; b. n. not quite reaching t.-m.; second s.m. quadrate, much shorter than first or third, receiving first r. n. near its end; third t.-c. strongly bent, third s.m. on marginal about as broad as second. Labrum emarginate at apex, and mandibles simple, in female.

*Melissina viator*, sp. n.

♀.—Length 9–10 mm., anterior wing about 7¼.

Black, for the most part densely covered with pubescence, except the hind margins of the abdominal segments, which are bare and conspicuous; hair of head and thorax white,

except on thorax above, where it is entirely fulvous ; head very broad, eyes red ; clypeus, except the upper part (the amount variable) and the reddish anterior edge, white ; labrum white ; mandibles broadly white at base ; ocelli large, in a curve ; antennæ short, the apical half or more of the flagellum ferruginous beneath ; tarsi ferruginous at apex ; knee-plate of hind legs obtusely pointed ; hair of hind basitarsi within largely nigro-fuscous ; tegulæ pale testaceous. Wings hyaline, faintly brownish ; nervures reddish ; second s.m. not pentagonal. First abdominal segment with long white hair, the others with very broad and dense basal hair-bands, rather dull white, not narrowed in middle ; hair at apex white, except round the apical plate, where it is fuscous ; venter of abdomen somewhat reddish.

♂.—About 9 mm. long.

Similar except for the usual sexual differences ; flagellum about 7 mm. ; antennæ bright ferruginous beneath beyond the middle of the fourth segment ; clypeus entirely ivory-white, feebly punctured ; apical plate of abdomen truncate ; eyes red as in the female.

*Hab.* Karachi, N.W. India, 1909, female (type) in August, male in June (*Comber*). British Museum.

Judging by the too short description, *Macrocera clypeata*, Radosz., seems to be closely allied, differing by the entirely white clypeus of the female. It will, of course, be necessary to know the mouth-parts of *clypeata* before referring it to *Melissina*.

### *Prosopis cookii*, Metz, 1911.

The type locality of this species is given by Metz as "Filmore Canyon, Colo.," but Filmore Canyon is in the Organ Mountains, New Mexico *.

### *Coquillettapis melittoides*, Viereck.

I recently saw the type of this in the U.S. National Museum ; it is apparently *Diadasia nigrifrons* (Cresson), so far as I could judge without actually comparing authentic specimens of *nigrifrons*. It is not related to *Entechnia*.

### *Panurgomia fuchsi*, Viereck.

I have examined the type female in the U.S. National

* I also take occasion to note that *Epitrioza medicaginis*, Crawford, 1911, published as from "Colorado," came from New Mexico.

Museum; it is in poor condition. It looks like a Nomiine with the second t.-c. wanting, but it is very different from *Steganomus nodicornis* by the pointed marginal cell and the *Andrena*-like basal nervure, falling a little short of t.-m., and not bent at its lower end. (Bingham's figure of the basal nervure of *Steganomus nodicornis* is misleading, as shown by a specimen in my possession from F. Smith's collection.) The third t.-c. has a very strong double curve and does not resemble this nervure in *Melitta*. There is no curled floccus on hind trochanter, and the sides of face are shining, wholly without foveæ. The flagellum is short like that of *Nomia*, red beneath. The area of metathorax is finely granular; the sides of the apical truncation are rounded, and there is a deep apical pit; the metathorax is wholly different from that of *Nomia arizonensis*, flying in the same general region. The hind tarsi have long coarse simple hairs. Clypeus smooth and shining, with scattered punctures, large and very small; mandibles bidentate; pubescence of thorax above matted, cannot be described; hind margins of abdominal segments reddened; apical plate of abdomen round at apex, its surface concave, no sign of any keel. The palpi have never been examined. In the venation, the character of the metathorax, the short flagellum, &c., *Panurgomia* nearly agrees with *Dasypoda*, but the latter has the apical plate of abdomen emarginate. On the whole, I think *Panurgomia* will prove to be an American representative of *Dasypoda*.

*Dolichochile melittoides*, Viereck.

I examined the female type in the U.S. National Museum. Sides of face shining, without foveæ; mandibles extremely long, with a pair of little notches near the middle, the interval between them forming a small tooth; venation as in *Melitta*, with the characteristic third t.-c and pointed marginal cell; area of metathorax granular, not defined; apical plate of abdomen pointed, strongly keeled. *Melitta americana* has the keeled apical plate, but different metathorax and mandibles. In the Asiatic *M. altissima* the apical plate is not in the least keeled. *Dolichochile* is a valid genus, close to *Melitta*.

*Melitta* (*Brachycephalapis*) *californica*, Viereck.

I examined the type female in U.S. National Museum. No facial foveæ; black hairs at extreme sides of face;

middle of scutellum shining and impunctate; area of metathorax triangular, plicate basally, and with a long median plica (thus essentially as in *Melitta altissima*); anterior basitarsi with dense orange-fulvous hair within, the other basitarsi with the same, but redder on hind ones; third s.m. shaped as in *Dolicochile* and *Melitta americana*; apical plate of abdomen with basal half finely densely punctured and with no keel. It is doubtful whether the subgenus *Brachycephalapis* can be maintained; the insect really is nearer to typical (European) *Melitta* than is *M. americana*.

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## LXXV. — *The Holotypes of the Fossil Scorpions* Palæomachus anglicus *and* Palæophonus caledonicus. By F. A. Bather.

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### 1. *Palæomachus anglicus* (H. Woodward).

Mr. R. I. Pocock (1911, Palæont. Soc. Monogr. Terrestrial Carboniferous Arachnida, p. 16) has founded a new genus of scorpions, *Palæomachus*, for the reception of *Eoscorpius anglicus*, H. Woodward (1876, Quart. Journ. Geol. Soc. vol. xxxii. p. 58), no similar species being known. Further, Mr. Pocock has selected as the holotype of this species the chela from the Coal-Measures of Skegby New Colliery, near Mansfield, Notts, which was the original of Dr. Woodward's plate viii. figs. 3, 3 *a* (*op. cit.*), and is preserved in the Geological Department of the British Museum (regd. I. 994 *a*). In relabelling and remounting this specimen for exhibition I had the curiosity to compare it with the figures of those two authors, but the matrix with which so much of the fossil was still obscured, both in the relief and in the counterpart, prevented me from recognizing the structures represented by them. On clearing away the matrix—a delicate and lengthy but not in other respects a difficult task—the whole outline of the chela was brought to view, and proved very different from that hitherto imagined.

The proximal segment preserved—the trochanter, with a width of 4·6 mm. and a length of 3·2 mm.—is much more like the same segment in *Scorpio afer*, as figured by Dr. H. Woodward (*tab. cit.* fig. 4), than it is like that author's representation of it (fig. 3). Its posterior or outer portion is marked by a deep wide groove (appearing as a ridge in the fossil).

The second segment—the humerus,—which is very clearly exposed, has a length of 9·4 mm. and a greatest width of 3·2 mm. On the side of the segment next the observer is a serrate or granular longitudinal crest, nearer to the anterior than to the posterior margin, and dying away distally.



The chela of *Palæomachus anglicus*, drawn, with camera lucida, from the two halves of the holotype (Brit. Mus. I. 994 *a*) by Miss G. M. Woodward. Where the outline is expressed by a dotted line, the precise limits are not clear in the fossil. × 1½ diam.

The third segment—the brachium—is not so clear in the relief, but is better shown on the counterpart. Its length is about 10 mm., its width about 3·3 mm. There is a slight, non-granular, longitudinal ridge, perhaps two, on the side next the observer.

The hand has a length of 8·2 mm., measured from the proximal joint to the groove between the two fingers; it has a greatest width of 6·6 mm. The outline is subquadrate, tending to rhomboidal, with the lobe scarcely defined. The outer portion, leading up to the movable finger, is separated by a longitudinal depression from the main oval portion.

The fingers are long and slender. The outer one appears to have been the movable finger, and the articulation to the hand can be distinguished in the relief; the distal portion is preserved only in the counterpart. The length of this finger is 10·5 mm.; its width in the distal two-thirds does not exceed 1·7 mm.; but at the proximal end is a projection (the finger-lobe) on the inner side. The outer margin has a slight convex curvature. The inner or anterior finger, which does not appear to have been movable, has a length of 8·7 mm.; its width in the distal two-thirds does not exceed 2 mm.; but at the proximal end is a projection on the inner side, as well as a knob, so that between the knob and the projection lies a longitudinal groove, which may have received the finger-lobe. The knob may, however, be merely a piece of the matrix filling the exoskeleton of the finger, the rest of

the finger being preserved only as an imprint ; it is hard to decide, for all these structures have been exposed by the mechanical and chemical removal of matrix, and are therefore not so clear as could be wished. The outer margin of the fixed finger has a slight concave curvature. The distance between the inner edges of the two fingers at their proximal ends is about 2 mm., at their distal ends 6·5 mm. The separation of the fingers at the base, the presence of a finger-lobe, and the considerable width of the hand are characters which, when taken together, suggest that this chela belonged to a male. The relations of the fingers and of the keels seem to indicate that it was the chela of the right side.

This description has been given in some detail, partly because it was high time for the holotype of a genotype to receive a description of some sort, partly because Mr. Pocock in his classification lays great stress on the characters of the chela, and in this particular instance says "the species may be distinguished at once from all other Carboniferous Scorpions in which the chela is known by the shape and proportions of the segments of this appendage." Even if Mr. Pocock had examined the specimen he could not have seen the shape and proportions of the segments, because, like the Spanish fleet, they were not yet in sight.

Since, moreover, Mr. Pocock admits the possibility of the paratypes—the tails from Skegby (I. 994 *b*) and Sandwell Park (I. 5432)—belonging to a different species or even genus, it must be on the characters of the chela alone that he founds his genus *Palæomachus*. Those characters he gives as: "Hand broad and oval, its width greatly exceeding that of the brachium, its length exceeding that of the fingers, which are short and in contact when closed, the length of the immovable digit about equal to the width of the hand." This must now be altered as follows:—Hand broad, subquadrate, twice as wide as brachium, shorter than fingers, which are long and slender [and may or may not have been in contact when closed], the movable finger being the longer and one-quarter as long again as the hand.

It may be added that the toothed inner margin of the fingers shown in the published figures is just as imaginary as the rest of the outline. Whether the margins bore teeth or no I cannot learn from the specimen, but I incline to think that the outline must have been very much like that of the fingers in Mr. Pocock's figure of *Anthracoscorpio dunlopi* (*op. cit.* p. 22).

It might be inferred from the previously published figures that the fossil was meant to be represented as having the movable finger on the inner or flexor side of the chela, thus

differing from all other scorpions recent or extinct. Two other interpretations, however, are conceivable: first, that every segment of the limb was bent backwards into an unnatural position so as to form a reversed curve; or, secondly, that while the trochanter, humerus, and brachium retained their natural positions, the hand was twisted round on its wrist-joint. This last hypothesis, Mr. Pocock tells me, was the one that came naturally to him. Fortunately neither of these rather violent assumptions is now necessary. The chela lies with all its segments in a natural position, and its fingers are perfectly normal.

Reverting to the generic diagnosis, we find that the only diagnostic character unaltered is the relative width of the hand. Whether this possibly sexual character is alone enough to substantiate an independent genus must be left to Mr. Pocock to decide, for on these fossils I cannot speak as one having authority. Indeed, had not Dr. W. T. Calman brought his knowledge to check and confirm these observations and interpretations (a friendly help for which my hearty thanks are tendered), I should scarcely have ventured on publication.

### 2. *Palæophonus caledonicus*, J. Hunter.

When writing the 'Guide to the Fossil Invertebrate Animals in the British Museum' (1907), I came to the conclusion that the fossil described by Mr. Pocock as *Palæophonus hunteri* (Quart. Journ. Micr. Sci. 1901, p. 291) was more properly to be called *Palæophonus caledonicus*, and that name was used on page 90 of the 'Guide.' Mr. Pocock, in his Monograph (p. 10), says he does "not know where Mr. Peach described it under that name." The facts are these:—Dr. John R. S. Hunter discovered the specimen in June 1883. In December 1884 he was led by Thorell and Lindström's publication of *Palæophonus nuncius* to announce his discovery to the Edinburgh Geological Society; but the paper in which the name *Palæophonus caledonicus* first appeared was one read by him to the Geological Society of Glasgow in May 1885, but not published till 1886 (Trans. Geol. Soc. Glasgow, vol. viii. pp. 169–170). Meanwhile, on 29th January, 1885, Mr. B. N. Peach had published a figure and description of the fossil in 'Nature,' though without a name. Since the specimen was unique, there could be no question but that Hunter's name and Peach's description referred to the same species. But any possible doubt or objection was removed in 1887 by the publication of Hunter's

paper read in 1884 (Trans. Edinb. Geol. Soc. vol. v. pp. 185–191) : herein the name *Palæophonus caledonicus* was prefixed to a description of the fossil and a comparison of it with *P. nuncius*.

Of the two known Silurian scorpions the holotype of *Palæophonus nuncius* alone remains, one of the most valuable treasures of the Swedish State Museum. The even more remarkable specimen of *Palæophonus caledonicus* has perished, with many another priceless type, in the ashes of Kilmarnock Museum ; but fortunately we have the authoritative description by Mr. Pocock, which must be associated with the name first given by Dr. Hunter.

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## BIBLIOGRAPHICAL NOTICES.

*Figures and Descriptions of the Fishes of Japan, including Riukiu Islands, Bonin Islands, Formosa, Kurile Islands, Korea, and Southern Sakhalin.* By Shigeho Tanaka, Instructor in Zoology, Science College, University of Tokyo, Tokyo, 1911. Gr. 8vo.

Of this, the latest addition to Japanese zoological literature three parts have appeared since April, each part consisting of one sheet of letterpress and five lithographic plates. The text is written in Japanese as well as English. No systematic sequence of the species is adopted, the author being apparently guided in his selection by the materials at his disposal, by the degree in which addition to our knowledge of a species is desirable, or by other similar considerations. Thus in the three parts published he has treated of twenty-four species from fresh water as well as from the littoral and deep-sea fauna. The descriptions are short, shorn of insignificant detail, and, with the addition of the accompanying excellent figures, perfectly sufficient.

The work will be of the greatest assistance to the student of Japanese Fishes, whatever its limitation may be finally ; and we trust that the author will be able to continue it to its completion at a faster rate than he intends at present, viz. at the rate of six parts annually.

*British Freshwater Fishes.* By C. Tate Regan. Methuen & Co.

Anglers and naturalists should be most grateful to Mr. Regan. His book gives clear descriptions, lucid keys, and adequate figures of all the species, and admirably epitomizes all that is sound in our knowledge of their life-history. Classification, necessarily technical in language, is restricted to what a systematist would require in

informing himself of the affinities of a particular group, but the general reader would probably have welcomed a diagram or two elucidating the anatomical characters mentioned in the text; and a little more detail explanatory of the method of counting scales would have been useful, especially in such a critical case as that of the scales between the adipose fin and lateral line of salmon and trout. Mr. Regan must surely himself have been pestered by people who seem unable to read this character for themselves. Vernacular names are well chosen, and on the whole the scientific nomenclature is reasonable, though a gem like *Blicca björkna* might have been mitigated by the addition of a more familiar *alias*. It might have been mentioned that "pink," given on p. 41 as a name for salmon parr, applies on some rivers in Ireland to the first silvery stage of sea-trout. Readers of p. 28 may possibly infer that salmon are generally capable of leaping a fall of 10 feet, whereas half that height seems too much for most of them.

The treatment in Chapter IV. of the different forms of trout is worth close attention, especially by readers who contemplate the improvement of a fishery by the introduction of supposed fixed species or races. Even sea-trout are held by Mr. Regan (no doubt rightly) to be reinforced in nature by the offspring of brown trout and *vice versâ*.

The attention given to the chars is perhaps out of proportion to the treatment accorded to other groups; but while the author does not expect acceptance of all his views as to the specific value of the distinctions which he draws between these interesting communities of colonists, isolated by profound alteration of geographical conditions, so full a summary of his recent investigations is certainly welcome. Of great convenience will be the clues afforded to the maze of Cyprinoid hybridization, and the concluding chapter on geographical distribution is distinctly good. On the whole the worst one can say of the book is that it contains no definite promise of a companion volume or volumes on the sea fishes.

E. W. L. H.

### *Zoological Address-Book.*

A second edition of the 'Zoologisches Adressbuch' has just been issued for the German Zoological Society by Friedländer and Sohn for seventeen marks bound. It is a bulky volume of 1110 pages and from the careful manner in which people were circularized in this country should be found of great service. Universities, Academies, and Societies are included, and the number of names listed reaches the astonishing total of 17,800, all drawn up into one index at the end. Palæontologists are included. Errors can be found; what book of this nature is free from them? and such errors are frequently due to the indolence of those who receive the circular and do not trouble to reply to it.

## PROCEEDINGS OF LEARNED SOCIETIES.

### GEOLOGICAL SOCIETY.

April 5th, 1911.—Dr. C. W. Andrews, B.A., F.R.S., Vice-President, in the Chair.

The following communications were read :—

1. 'Trilobites from the *Paradoxides* Beds of Comley (Shropshire).' By Edgar Sterling Cobbold, F.G.S. (with Notes on some of the Associated Brachiopoda by Charles Alfred Matley, D.Sc., F.G.S.).

The Author describes and illustrates the type-specimens of *Paradoxides groomii* Lapworth, 1891, and the associated trilobites from the basement beds of the Middle Cambrian of Comley Quarry. Among the latter there are two or three other species of *Paradoxides*, represented by fragments insufficient for specific determination; also a species of *Dorypyge*, allied to *D. oriens* Grönwall, and one of *Conocoryphe* allied to *C. emarginata* Linnarsson. He also describes some of the trilobites from a higher horizon containing *Paradoxides davidis* Salter and *P. rugulosus* Corda; and notes on the brachiopoda from this horizon are contributed by Dr. Matley.

A complete list of the trilobites hitherto identified from the local Cambrian deposits is given, arranged under the following provisional faunal groups :—

MIDDLE CAMBRIAN.

*Davidis* Fauna from the Shoot Rough Road Beds.
*Groomii* Fauna from the Quarry Ridge Grits.

LOWER CAMBRIAN.

*Protolenus-Callavia* Fauna from the Grey and *Olenellus* Limestones.

The Author draws attention to the great divergence between the two last-named faunas, and also describes the recently exposed evidence of the accompanying physical break between the Middle and the Lower Cambrian beds of the locality: arguing from the analogy afforded by American deposits that, if the *Olenelli* with telson-like pygidia were ever present in Shropshire, their place in the local series would be among the strata cut out by the unconformity.

2. 'The Stratigraphy and Tectonics of the Permian of Durham (Northern Area).' By David Woolacott, D.Sc., F.G.S.

The Permian strata of Durham and Northumberland lie unconformably on a basin of the Coal Measures. They can be divided as follows :—

(4) Upper red beds with salt and thin fossiliferous Magnesian Limestones (only exposed in the south of Durham). 300 feet.

(3) The Magnesian Limestone.

(*a*) Upper.

1. Yellow bedded limestone of Roker. 100 feet.
2. The concretionary limestone of Fulwell and Marsden—a series of concretionary and non-concretionary limestones and marls. 150 to 250 feet.
3. The Flexible Limestone. 10 to 12 feet.

(*b*) Middle.

(1) Unbedded (as a rule), highly fossiliferous (often) limestone of Claxheugh, Tunstall, etc. Forms a ridge of high ground and reaches a thickness of 300 feet. Often brecciated and entirely changed in character—rendered more calcareous and fossils obliterated. — replaced on the east by — Bedded yellow, non-fossiliferous limestones of the northern end of Marsden Bay and the coast from Hendon to Seaham Harbour. Often highly brecciated. 150 feet.

(*c*) Lower. Bedded brown limestones of Frenchman's Bay, Houghton, etc. Upper beds often disturbed. 40 to 200 feet.

(2) The Marl Slate. 3 feet.

(1) The Yellow Sands, from 0 to 150 feet.

These beds, which vary much in thickness, lie in North Durham in the general form of a syncline beneath Sunderland.

The unfossiliferous Yellow Sands are probably a deltaic formation reassorted by wind, the other beds being the result of deposition in an inland sea undergoing desiccation. The magnesium carbonate existed in the waters of the sea, and was either deposited along with the calcium carbonate, or introduced by seepage when the beds were being laid down.

Great changes in the amount and distribution of these carbonates has, however, taken place since deposition. The cellular structures that occur in the limestone can be classified as follows:—(1) Concretionary-cellular; (2) negative breccia; (3) solution-cavities; and (4) fractured cellular. Most of them have been produced by the leaching-out of the magnesium carbonate (dedolomitization), or of both that and calcium carbonate. In some cases the rock has been rendered crystalline, as well as more calcareous, and the fossils have been obliterated. They do not afford any proof that the rock has been dolomitized subsequent to deposition. The percentage of calcium carbonate is sometimes over 99, while that of magnesium carbonate is occasionally as much as 50.

The fauna of the Magnesian Limestone is very restricted (about 140 species) and most peculiarly distributed. The marked palæontological features are the profusion of individuals in the Middle Fossiliferous Limestone (which appears to have formed

a shell-bank in the Middle Magnesian-Limestone sea), and their sudden disappearance in the Upper Limestone. No corals, echinoderms, polyzoa, brachiopods, or cephalopods have ever been found above the top of the Middle Fossiliferous division: only a few fishes, gastropods, lamellibranchs, entomostraca, and foraminifera occurring in the Upper beds. The Lower and Middle Fossiliferous Limestones are marked by the presence of *Productus horridus* Sow. Fish-remains occur at two horizons: namely, the Marl Slate and the Flexible Limestone, and the beds above these deposits.

The Brecciated Beds, which occur at various horizons, chiefly however in the two Middle divisions, constitute the most marked tectonic feature of the Magnesian Limestone of the area. They have been produced by thrusting, which brought about a decrease in the lateral extension of the Permian. Associated with the breccias are other proofs of thrusting: (1) Thrust or shear-planes; (2) disturbed and displaced masses of Lower Limestone; (3) intruded breccias; (4) slickensided and grooved, horizontal and vertical surfaces; (5) cleavage; (6) folding, both on a local and on a general scale; (7) buckling, thickening, and squeezing-out of beds; (8) phacoidal and other structures; and (9) fissuring. The main thrust at Marsden appears to have acted from a few degrees south of east to a few degrees north of west; there are, however, distinct evidences of movement from other directions in different parts of the district. Experiments made on the compressive strength of the rocks affected by the thrust at Marsden, indicate that the thrusting reached a maximum of about 300 tons per square foot. Observations made by Mr. S. R. Haselhurst, M.Sc., in the Cullercoats area seem to prove that the thrusting occurred later than the post-Permian movement of the Ninety-Fathom Dyke—some faulting in the area is, however, later than the thrusting—, and it appears evident that the shattering of the strata was produced prior to the pre-Glacial era of denudation. It may have been connected with the Miocene movements that produced such marked changes in the physiography of Britain.

May 10th, 1911.—Prof. W. W. Watts, Sc.D., M.Sc., F.R.S., President, in the Chair.

The following communications were read:—

1. 'The Lower Carboniferous Succession in the North-West of England.' By Prof. E. J. Garwood, M.A., Sec.G.S.

The area dealt with includes the whole of Westmorland north and west of the Dent Fault, together with North Lancashire to the north of the Lune Valley; and the extreme northern corner of Yorkshire, to the west of Middleton-in-Teesdale, is also included.

The following general succession has been established:—

| | *Zones.* | *Sub-zones.* | *Bands.* | *Probable Bristol Equivalents* |
|---|---|---|---|---|
| Beds with *Lithostrotion.* | *Dibunophyllum.* | Upper (?) ..... | Botany Beds. | $D_3$. |
| | | Middle — *Productus latissimus* and *Lonsdalia floriformis.* | *Saccammina.* / *Girvanella.* | $D_2$. |
| | | Lower — *Cyathophyllum Murchisoni.* | *Cyrtina septosa.* / *Daviesiella llangollensis.* | $D_1$. |
| | *Productus corrugato-hemisphericus* and *Spiriferina laminosa.* | Upper — *Nematophyllum minus.* / *Cyrtina carbonaria.* | Bryozoa Bed. | $S_2$. |
| | | Lower — Gastropod Beds. | *Clisiophyllum keyserlingi.* | $S_1$. |
| Beds without *Lithostrotion.* | *Michelinia megastoma.* | Upper — *Daviesiella carinata.* | | $C_2$. |
| | | Lower — *Camarophoria isorhyncha.* | *Spirifer* cf. *furcatus.* | |
| | *Athyris glabristria.* | Upper — *Seminula gregaria.* | *Thysanophyllum pseudo-vermiculare.* / *Rhynchonella triplicata.* / *Productus globosus.* | $C_1$. |
| | | Lower — *Solenopora.* | *Eumetria proava.* / *Pleurodictyum cleistoporoides.* | $\gamma$. |
| | | | | $Z_2$? |
| | Basement Conglomerate. | | | |
| | *Spirifer-pinskeyensis* Beds. | | | |

The value of the different zonal indices selected is discussed and their distribution over the area is described. It is shown that, whereas the zonal indices chosen for the larger groups of beds are often sporadically distributed in the zone, the bands form remarkably reliable horizons, extending frequently over large areas.

The rocks are described under the following districts :—

Shap and Ravenstonedale.
Kendal and Kirkby Lonsdale.
Arnside and Carnforth.
Grange and Furness District.
The Westmorland Pennines and Middleton-in-Teesdale.

For purposes of detailed description, the Shap-Ravenstonedale area is taken as the type, and the other districts are briefly compared with it. It is shown that in no one district is a complete development of all the zones observed, and that it is only by taking a broad survey of the whole area that the detailed faunal sequence can be definitely established.[1] In the Shap area the *Michelinia-megastoma* Zone is scarcely represented, while farther west the fauna of this horizon is one of the richest in the whole of the North-Western Province.

The changes in the fauna of certain zones, when traced over large areas, often depend more on the lithological characters of the rocks and their modes of deposition than on the introduction of new forms at definite horizons: thus certain corals, such as *Zaphrentis enniskilleni*, which is found to be associated with argillaceous deposits, characterize different horizons in different districts.

The deposits are shown to be for the most part of shallow-water origin. The period of greatest submergence appears to have been during the deposition of the *Nematophyllum-minus* Beds and the Lower *Dibunophyllum* Beds.

The lowest deposits are characterized by highly magnesian limestones; these appear to have been deposited under lagoon-like conditions which encouraged the growth of calcareous algæ, especially *Solenopora*, and these in many places contribute largely to the formation of the deposits. The majority of the limestones throughout the series are rich in foraminifera, and the more shaly layers in ostracods and bryozoa.

The silicification of the organisms at many horizons in the sequence is discussed, and the conclusion is arrived at, that both silicification and dolomitization of the limestones were practically contemporaneous with the deposits in which they occur. The presence of spotted and 'brecciated' limestones is shown to be characteristic of the upper portion of the Lower *Dibunophyllum* Zone.

The movements which have affected the rocks in the Arnside district have been the result of nearly horizontal thrusts, and it is shown by means of zoning that the beds have, in places, been inverted and are dipping at over 120°.

The palæontological divisions here described are correlated with their probable equivalents in the Bristol area; but no exact comparison has been found possible in the case of the lowest beds, which occur in Pinskey Gill.

In the palæontological portion of the paper several new species of corals and one new genus are described, and the affinities of several corals and brachiopods are discussed.

[1] Thus the lowest zones are practically absent from the Cross Fell area, since the base of the Melmerby Scar Limestone represents an horizon high up in the *Nematophyllum* sub-zone: showing that the complete submergence of this district did not take place until long after that of the area farther to the west.

2. 'The Faunal and Lithological Sequence in the Carboniferous Limestone (Avonian) of Burrington Combe, Somerset.' By Prof. Sidney Hugh Reynolds, M.A., F.G.S., and Arthur Vaughan, M.A., D.Sc., F.G.S.

Lithology.—The series is almost continuously calcareous from the base of Z to $D_1$, where the section ends; the K beds are, to a large extent, shales. Crinoids are the prevalent limestone-builders throughout K, Z, and $C_1$; in $C_1$ the rock is largely of the coarsely crinoidal type known as petit granit by the Belgian geologists.

A band of coarse oolite occurs in the upper part of $K_1$; but, apart from this, no oolite is met with until the top of $C_1$ is reached. $C_2$ and $S_1$ are very largely oolitic, conspicuous white oolite prevailing at the top of $C_2$. There is much oolite in the upper part of $S_2$.

An important point is the prominent part played by foraminifera, which are the principal limestone-builders in $C_2$, $S_1$, and much of $S_2$. Many of the oolitic limestones are foraminiferal; but, especially in $C_2$, there is much limestone abounding in foraminifera though not oolitic.

In the upper part of $S_2$, peculiar concretionary limestones, showing imperfect 'Cotham-Marble' structure, occur; but these are not so prominent as in other parts of the South-Western Province.

The Burrington section agrees with the other sections in the South-Western Province, in showing dolomitization in the upper $C_1$ beds. A strong development of chert occurs at three levels—$S_2$, $\gamma$, and $Z_1$.

Palæontology.—The palæontological portion includes notes on several early mutations of well-known Carboniferous gentes, and deals, in detail, with the megastomatid Michelinias and the large Caninias (*C. patula* and *C. cylindrica*). The essential similarity of developmental stages in vesicular structures in widely distinct groups of corals is illustrated in the cases of *Caninia cylindrica* and *Lonsdalia floriformis*.

The early Syringothyroid stage in the Carboniferous 'Spiriferinas,' a stage not observable in the Liassic type-species, is described, and the generic designation of *Syringothyris laminosa* is discussed.

A section is devoted to a comparison of the deposits at Burrington Combe with those at other points of the Belgian and South-Western Provinces. The great variability of deposit during the Mid-Avonian Period is emphasized, and the rapidity of accumulation of beds of crinoidal débris is compared with the slow growth of dolomitic limestone at that time.

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## LXXVI.—*Notes on the Coleopterous Family* Pselaphidæ *of the Group* Euplectini *of New Zealand, with Descriptions of Two new Genera and Twelve Species.* By Major T. Broun, F.E.S.

This group of the Pselaphidæ, according to the catalogue issued in February last by Herr Junk, of Berlin, consisted then of 128 genera, 13 of which occur in New Zealand. To these I now add two more, *Alloplectus* and *Kenocœlus*, which latter is a very curious insect. Two of these genera were described by Dr. Sharp, one by Mr. Leach, eight by M. Raffray, and the others by myself.

In that catalogue sixty-eight New-Zealand species are recorded; four of these are Dr. Sharp's, seven are Herr Reitter's, and fifty-seven are mine; so that the twelve described in this paper make a total of eighty. Besides these, the descriptions of twelve more new species of mine await publication by the New Zealand Institute, and M. Raffray sent to me for inspection seven species, formerly part of Herr Reitter's collection, which, with a single exception, differ more or less from any in my cabinet, and will therefore form a further addition to our list of the Euplectini.

Considering the number of recorded genera and species, and the fact that a species measuring 2 mm. in length by $\frac{1}{2}$ in breadth is a comparatively large one, it must be evident that the manipulation and study of such minute insects of

complex structure are very far from being easily accomplished even by expert entomologists.

As a rule, the species are not so rare as those of our Faronini; nearly all frequent heaps of decaying leaves in the forests, and are seldom found over wide areas.

T. Broun.

Mount Albert,
Auckland, N.Z.,
8th August, 1911.

*List of new Species.*

3376. Euplectopsis granulatus.
3377. „ fastigiatus.
3378. „ mucronellus.
3379. „ tumidus.
3380. Vidamus trochanteralis.
3381. „ armiferus.
3382. Zealandius raffrayi.
3383. „ illustris.
3384. „ fulgens.
3385. Alloplectus picipennis.
3386. „ subcæcus.
3387. Kenocœlus dimorphus.

## Euplectopsis, Raffray.

(Genera des Pselaphidæ, p. 82.)

### 3376. *Euplectopsis granulatus*, sp. n.

Robust, elongate-oblong, slightly convex; head and thorax subopaque, and, like the hind body, fusco-rufous, elytra fulvo-rufous, legs and antennæ red, tarsi and palpi testaceous; pubescence rather scanty on the head and thorax, more conspicuous on the abdomen than on the elytra, the outstanding slender setæ rather numerous.

*Head* smaller than the thorax, widest in line with the moderately large eyes, obliquely narrowed behind; the shallow frontal depression is not quite smooth and is furcate towards the eyes, but there are no perceptible foveæ; it is punctate-granulose. *Thorax* of about equal length and breadth, rather wider before the middle than elsewhere, rounded there, a good deal narrowed anteriorly, so that its apex is much narrower than the back of the head; median sulcus rather indistinct and ending in the small mesial basal impression, the lateral foveæ shallow, each with a linear prolongation towards the front; the middle of the base and the front are not quite smooth, the rest of its surface is covered with granules, each of these has a small puncture in it. *Elytra* subquadrate, with somewhat rounded shoulders; they are rather longer and broader than the thorax and are only indistinctly and finely punctate; the sutural striæ are deep and, like the short intra-humeral impression on each, are broad and foveiform at the base. *Hind body* almost as

broad as but shorter than the elytra, the basal two segments are horizontal and about equal, the first has a well-marked transverse basal impression, the second is similarly though less deeply impressed, the third is as long as the second in the middle but on a lower plane, the others are deflexed.

*Legs* only moderately stout; the anterior femora, however, are more incrassate than the other pairs; all the tibiæ are straight inwardly, but arcuate externally.

*Antennæ* robust, rather short, and bearing rather elongate pubescence; the exposed portion of the basal joint is slightly thicker, but not at all longer than the quadrate second; joints 3–6 are short and transverse, the fifth and sixth are slightly broader than the fourth; the seventh and eighth are strongly transverse and unsymmetrical, being a little prolonged inwardly and broader than the sixth; the ninth and tenth are nearly twice as large as the eighth and are also strongly transverse and unsymmetrical; eleventh conical, largest, as broad as the tenth, not acuminate.

*Underside* shining. Head finely granulate, without foveæ. Prosternum longitudinally carinate. Basal ventral segment short and thickly pubescent, 2–4 equal, fifth shorter and very slightly incurved, sixth as long as the fifth, incurved behind, seventh broadly conical.

Undoubtedly a near ally of *E. antennalis*, 3205, but readily distinguishable therefrom by the subopaque head and thorax, feebly impressed dorsal thoracic impressions but obvious granular sculpture, thick unsymmetrical antennæ, &c.

♂. Length $1\frac{3}{4}$; breadth $\frac{3}{4}$ mm.

Erua, elevation 2400 feet. A single male found amongst decaying leaves on the 2nd February, 1911.

### 3377. *Euplectopsis fastigiatus*, sp. n.

Glossy, sanguineous; elytra and legs of a lighter red, tarsi and palpi flavescent; pubescence yellowish grey, conspicuous and mingled with erect hairs on the abdomen; body slightly convex, narrowed anteriorly, the elytra and hind body together oblong and subparallel.

*Head* rather elongate, not as broad as the thorax, with very prominent eyes, very slightly narrowed behind these, with obtuse angles, antennal tubercles somewhat elevated and moderately distant; nearly smooth and flat in the middle, elsewhere a little uneven and coarsely punctate, but without definite foveæ. *Thoraæ* nearly a third longer than broad, oviform, widest near the middle, a good deal narrowed towards the front, smooth; from near the apex a linear

groove with subcarinate edges extends into and divides the broad, deep, semicircular, basal fossa, and is prolonged as a carina to the basal margin; lateral foveæ deep and prolonged forwards as distinct grooves, between these and the median groove the surface is somewhat ridged longitudinally towards the base. *Elytra* subquadrate, slightly longer and evidently broader than the thorax, slightly curvedly narrowed at the shoulders; sutural striæ deep, broad, and distinctly foveiform at the base; dorsal impressions short, broad, and deep. *Hind body* with deflexed apical segments, so as to seem shorter than the elytra; first segment with a fine carina at each side of the feeble median impression at the base, second horizontal and about as long as the first.

*Femora* robust, the posterior much less so; the intermediate tibiæ gradually yet considerably expanded towards the extremity, which is deeply notched.

*Antennæ* shorter than the head and thorax, moderately slender, with the terminal joints almost forming a triarticulate club; second joint quite oblong and rather longer than the exposed portion of the basal one, third rather longer than broad, obconical, much smaller than second; joints 4–8 submoniliform, small, broader than long, fifth and seventh slightly larger than adjacent ones; ninth subquadrate, twice as large as its predecessor and longer than the transverse tenth, the terminal conical and subacuminate, as long as the preceding two combined.

*Male.*—Metasternum broadly impressed. Basal ventral segment covered by the femora, ciliate behind, 2–4 equal, fifth widely incurved, the middle hardly more than half the length of the fourth; sixth longer than fifth, widely, deeply, and angularly emarginate; seventh also large and broad.

The male of *E. carinatus*, 3204, has the sides and base of the thorax rather coarsely punctate, but the basal fossa is not so deep; the legs are evidently thicker, and the middle tibiæ are not only thicker but also shorter and less deeply notched at the extremity; the anterior tibiæ have along the inside near the apex a fringe of yellow pubescence which is lacking in this species, and the insect itself is smaller. *E. schizocnemis*, 3203, may be distinguished by the coloration, even and less deeply marked thorax, without the least sign of longitudinal ridging; the elytra are gradually narrowed from near their apices to the base and their striæ are not so deep; the thighs are much stouter, the intermediate tibiæ are broader, the apical excision is larger and the outer angle more prolonged, and the head is only obsoletely punctured.

♂. Length 2; breadth $\frac{2}{3}$ mm.

Mount Pirongia, December 1909. I found a single male only.

3378. *Euplectopsis mucronellus*, sp. n.

Elongate, moderately narrow, slightly convex, shining, castaneo-rufous, tarsi and palpi fulvescent; the clothing greyish, rather short, and thinly distributed.

*Head* much smaller than the thorax, nearly straight behind the rather small and hardly at all prominent eyes, slightly narrowed anteriorly, antennal tubercles somewhat flattened backwards; the foveæ not sharply defined, prolonged and convergent in front; there are no perceptible punctures. *Thorax* suboviform, rather longer than broad, gently rounded and slightly broader before the middle; dorsal sulcus narrow, extending from before the middle to the moderately deep but not broad semicircular basal fossa; lateral foveæ deep, subrotundate, rather large, but not distinctly prolonged anteriorly, the antebasal transverse impression normal. *Elytra* a third longer than the thorax, oblong, only slightly narrowed near the base; sutural striæ deep, punctiform at the base, with a distinct basal puncture alongside each; dorsal impressions rather short, broad, and deep at the base. *Hind body* almost as broad as but rather shorter than the elytra, its basal three segments equal.

*Legs* elongate and moderately slender, the intermediate tibiæ gently arched externally and minutely prominent at the inner extremity.

*Antennæ* shorter than the head and thorax, moderately slender, their second joint fully as long as the visible portion of the thicker basal one; third smaller, rather longer than broad, gradually narrowed towards its base; joints 4–8 small, each about as long as broad, seventh very slightly longer; ninth subquadrate, a little larger than preceding ones; tenth transverse, moniliform, but little broader than ninth; the terminal conical and acuminate, as long as the preceding two united.

*Underside* chestnut-red, with grey pubescence. Metasternum unimpressed. Ventral segments 2–4 equal, fifth widely incurved, not quite as long as the fourth in the middle, sixth more deeply incurved, seventh broad, as long as the penultimate.

After a careful comparison with Reitter's types, I fail to find one that accords with this species; the nearest, but only so far as the middle tibiæ are concerned, is *E. microcephalus*. An undescribed species, now in possession of M. Raffray, is

very closely allied, but joints 5–7 of the antennæ are oblong-oval and the head is slightly broader.

♂. Length $1\frac{2}{3}$ ; breadth $\frac{1}{2}$ mm.

Southland. A single individual from Mr. A. Philpott.

### 3379. *Euplectopsis tumidus*, sp. n.

Shining, somewhat convex, moderately elongate; sanguineous or rufo-castaneous, rather variable; legs and antennæ paler, tarsi and palpi fulvescent; pubescence yellowish, rather short and more or less curled, the hind body with a few long erect hairs.

*Head* rather smaller than the thorax, slightly rounded behind the rather small medially situated eyes; antennal tubercles distant and subrotundate, not prominent; the surface distinctly and near the sides closely punctate, the rounded foveæ not very deep or sharply defined, and more or less confluent with the frontal impression. *Thorax* cordiform, about as long as broad, indistinctly punctate; the median furrow deep and broad, extending from the front to the deep, subquadrate, basal fossa; the lateral foveæ large, but becoming linear towards the apex, with a thin transverse impression uniting them with the central fossa. *Elytra* slightly broader than long, evidently larger than the thorax, curvedly narrowed near the base; sutural striæ well marked, deeper and foveate at the base, the dorsal ones also deep and broad, but becoming shallow before the middle. *Hind body* shorter than the elytra, its first segment horizontal, broadly medially impressed at the base, the others gradually deflexed. *Legs* simple, tibiæ nearly straight.

*Antennæ* shorter than the head and thorax, rather slender, finely and scantily pubescent; basal joint red, slightly longer than the oblong-oval second; joints 3–9 hardly differ, all subglobular and small; tenth transverse, evidently broader than the preceding ones; eleventh a little broader than tenth at the base, conical and distinctly acuminate, and, including the narrow apical appendage, as long as the preceding four combined.

*Male.*— *Underside* fusco-rufous, very thinly clothed; the head with elongate erect setæ, relatively coarsely punctate, with a slender frontal carina and a large depression at the base. Prosternum with a fine carina along the middle. Abdomen rather longer than the convex metasternum; basal segment covered by the femora, second rather large, broadly medially emarginate at the apex, much swollen outwardly; third, in front, with a deep sinuosity at each side of the

median angular prominence; fourth and fifth very short in the middle, together shorter than the third; sixth slightly longer than fifth, widely yet slightly incurved, seventh rather longer, transverse, rounded.

*Female.* — Basal dorsal segment similarly impressed; second ventral segment slightly longer than third, the next two, singly, a little shorter than the third; sixth curvilinearly triangular, about as long as the preceding two combined.

The form and sculpture of the head and thorax, the elongate and very acuminate terminal joint of the antennæ, in conjunction with the remarkable second and third ventral segments of the male, distinguish this species. It is entirely different from the more cylindrical series, such as *E. parvulus*, 2727, and Reitter's *E. microcephalus*. It must be placed at the end of the genus, as the deep thoracic sculpture closely resembles that of Raffray's *Plectomorphus*.

Length $1\frac{2}{3}$; breadth nearly $\frac{2}{3}$ mm.

Erua, January 1910; Waimarino, and also found amongst leaf-mould sent to me from Makatote by Mr. W. S. Guinness.

About a dozen specimens of this somewhat variable species.

## Vidamus, Raffray.

(Genera des Pselaphidæ, p. 89.)

### 3380. *Vidamus trochanteralis*, sp. n.

Shining, castaneo-rufous, sometimes much paler, antennæ and legs fulvescent; the clothing rather elongate and conspicuous on the hinder parts, and mingled with a few erect slender setæ.

*Head* large, a good deal rounded behind the prominent eyes, not definitely punctate; the foveæ large but not very deep, on about the same plane and continuous with the depressed frontal portion. *Thorax* hardly wider than the head at or just before the middle, much narrowed anteriorly, a little longer than broad, the disc smooth; basal median fossa somewhat angulate, the transversal linear impression between it and the large lateral foveæ sometimes indistinct, the basal margin indistinctly tripunctate. *Elytra* about as long as broad, wider than thorax at the base, still more so behind, and obviously longer than that is; sutural striæ well marked throughout and punctiform at the base, intrahumeral striæ deep but short; between these striæ on each elytron there is a distinct basal puncture. *Hind body* rather narrower than the elytra, the basal visible three segments almost equal.

*Legs* moderately elongate and slender, tibiæ nearly straight; the middle pair gradually but not strongly incrassate towards the extremity and armed on the inside with a calcar-like process which is directed backwards but does not attain the apex.

*Antennæ* moderately elongate and bearing long slender hairs; first joint stouter, yet not much longer than second; joints 3, 5, and 7 oblong, sixth and eighth smaller than adjacent ones, tenth distinctly larger than ninth, both subquadrate, eleventh as long as the preceding two united, conical and subacuminate.

*Underside* with greyish pubescence. *Prosternum* not carinate. *Metasternum* transversely convex, but impressed or flattened in the middle. Basal *ventral segment* partly concealed by the femora; segments 2–4 gradually decrease in length, fifth still shorter and slightly medially incurved behind; sixth rather ill-defined, in the middle about the length of the third, sinuate at each side; seventh conical. The intermediate *trochanters* are spined.

*Female.*—Sixth segment large, punctate, and broadly triangular.

In one male the true basal dorsal segment is quite exposed and nearly covered with minute brassy squamæ, in all the others this segment is entirely concealed.

♂. Differentiated from *V. calcaratus*, 3210, by the smaller size, manifestly more slender legs, far less distinct armature of the intermediate tibiæ, narrower thorax, and spined trochanters.

Length 2; breadth quite ½ mm.

Erua and Waimarino, elevation 2400–2700 feet, January 1911.

I secured a dozen specimens; some slight variations occur amongst them, but the male characters seem to be constant.

3381. *Vidamus armiferus*, sp. n.

Slender, elongate, depressed, nitid; fusco-rufous, head and thorax of a lighter hue, legs and antennæ fusco-testaceous, pubescence greyish; more or less finely punctate, the abdomen most distinctly.

*Head* as large as the thorax, slightly rounded behind the small eyes, gradually narrowed anteriorly; interocular foveæ well marked, but somewhat indistinctly prolonged and convergent in front. *Thorax* rather longer than broad, oviform; lateral foveæ rotundate, basal fossa small, angular, and transverse, with a median groove extending from it to the base,

the usual antebasal impression is distinct. *Elytra* oblong, rather longer and broader than the thorax, moderately narrowed near the base; sutural striæ broad, foveiform at the base, intrahumeral impressions foveiform, short, but not deep. *Hind body* much shorter than the elytra, finely yet quite perceptibly punctured; second segment almost as long as the first, longitudinally subcarinate in the middle, and somewhat impressed towards the sides; the third as long as the first in the middle, broadly rounded there at the apex.

*Legs* proportionally moderately stout, the intermediate tibiæ armed with a distinct calcar at the inner extremity.

*Antennæ* almost as long as the head and thorax, second joint oviform and nearly as large as the basal one; joints 3–8 moniliform, the fourth, sixth, and eighth equally small, fifth and seventh very slightly broader; ninth and tenth transverse, the former distinctly broader than the eighth, but not quite as broad as the tenth; the terminal large, conical and subacuminate, and as long as the preceding three united.

The following are distinctive features:—The slender form, infuscate surface, the armature of the intermediate tibiæ, and medially subcarinate second dorsal segment. *V. spinipes*, 3048, is a larger stoutly built insect, with a spine between the middle and inner apex of the middle tibia, and its thorax is cordate.

♂. Length $1\frac{1}{3}$; breadth $\frac{1}{3}$ mm.

Greymouth. One damaged specimen from Mr. J. H. Lewis.

## Zealandius, Raffray.

(Genera des Pselaphidæ, p. 111.)

### 3382. *Zealandius raffrayi*, sp. n.

Shining, dark rufous; legs and antennæ paler, tarsi and palpi obscurely fulvescent; pubescence pale brassy, decumbent, rather short and thick, but, on the thorax particularly, mingled with very slender hairs; along the sides and on the hind body there are a few outstanding setæ.

*Head* large, not quite the breadth of the thorax, narrowed in front of the small coarsely facetted eyes; genæ nearly straight, with obtuse hind angles; occipital foveæ rather large yet not distinctly prolonged forwards, the interantennal portion a little depressed and less evidently punctate than the sides or vertex. *Thorax* of nearly equal length and breadth, rounded and widest before the middle; its punctuation irregular, rather indistinct on the disc, but closer and coarser

near the base; median groove broad and deep, extending almost from the apex into the large basal depression, which, however, is not distinctly united to the large lateral foveæ. *Elytra* about as long as broad, more or less narrowed towards the shoulders, rather finely and distantly but not very definitely punctured; the sutural and dorsal striæ are broad, with subcarinate intervals. *Hind body* as broad as the elytra, indistinctly punctate; third segment in the middle slightly longer than the second or first, the others deflexed and attenuate.

*Legs* stout and elongate, front and middle femora stouter than the posterior; intermediate tibiæ distinctly curved and thicker than the others, notched at the extremity, the outer angle somewhat prolonged, the inner prominent but not exactly calcarate; the extremity of the anterior is of nearly similar structure, but less distinctly so.

*Antennæ* nearly as long as the head and thorax, basal joint red, punctate, cylindrical; second ovate-oblong, not quite so thick as the first, but as long as the third and fourth combined; fifth slightly longer than adjacent ones, eighth moniliform, evidently smaller than the ninth or seventh, the tenth distinctly broader than its predecessor, narrowed apically, the terminal large, conical, and acuminate.

*Underside* shining, the pubescence rather more conspicuous on the middle of the second and sides of the last segments. Prosternum longitudinally carinate in front. Metasternum with a large median impression and a short, thick, longitudinal carina at its base. Basal ventral segment concealed by the femora, segments 3–5 nearly equal, sixth rather longer than fifth, medially arcuate-emarginate, the operculum of the seventh oblong and in some lights appearing foveate or impressed at each side. Intermediate trochanters subtriangular and distinctly spined; the posterior prominent, with a rather thick process, not a spine, situated behind and close to the coxæ.

*Female.*—Very similar. Head rather more distinctly punctured. Joints 6 and 8 of the antennæ rather smaller than the contiguous ones, as is sometimes the case in the other sex, 3–5 also vary a little, being either bead-like or obconical.

The type of the genus, *Z. obscurus*, 2478, is a very different insect, being subopaque, much smaller, with rather dense distinct punctation, but rather feeble thoracic impressions.

Length 2; breadth quite $\frac{1}{2}$ mm.

Erua, elevation 2400 feet. Both sexes found by me in

January 1911, and a male found amongst decaying leaves collected by Mr. W. J. Guinness near Mount Ngauruhoe.

This, the finest species of the genus, is named in honour of M. Achilles Raffray, who has spent the best of his lifetime in studying the Pselaphidæ.

3383. *Zealandius illustris,* sp. n.

Nitid, slightly convex, castaneo-rufous; antennæ, palpi, and legs fulvescent; pubescence short, pale yellowish, very scanty on the head and thorax, and with a few upright elongate hairs on the hind body.

*Head* rather elongate, not as broad as the thorax, slightly narrowed behind the small convex eyes; relatively coarsely and irregularly but not closely punctured, its surface nevertheless is quite shining; interocular foveæ small, not sharply defined, and only very indistinctly prolonged forwards, the interantennal portion depressed. *Thorax* of about equal length and breadth, widest before the middle, rounded there, much narrowed anteriorly; its punctation like that of the head, but more distant and shallow on the disc and nearly obsolete in front; lateral foveæ subrotundate, median sulcus rather broad, almost touching the front and dividing the transverse basal impression. *Elytra* suboblong, gradually narrowed towards the shoulders, without visible punctation; sutural and dorsal striæ broad, deep at the base, the dorsal becoming shallow near the apices, the lateral indistinct, with subcarinate interstices; the extremity of each elytron, near the side, is slightly raised, but not tuberculate. *Hind body* as broad as the elytra, apparently impunctate, its basal three segments almost equal, the first with an indefinite median transverse impression at the base.

*Antennæ* moderately elongate, finely pubescent; basal joint rufescent, stout, cylindric, the next oblong-oval, more slender, and rather shorter; third and fourth obconical, rather small, fifth oblong-oval, seventh rather longer than the subquadrate sixth or eighth, the ninth evidently larger than the eighth but not as broad as the transverse tenth; the terminal large, about as long as the preceding two together, conical and distinctly acuminate.

*Legs* moderately elongate, femora stout; the intermediate tibiæ thicker than the others, abruptly narrowed at the extremity, so that near that point on the inside there is an angulation or obtuse calcar; the anterior are similarly but much less distinctly angulate near the apex.

*Underside* finely and irregularly punctate and pubescent. Head with a well-marked basal fovea and a fine longitudinal carina in front. Prosternum finely carinate along the middle. Metasternum with a large median fovea. Ventral segments 2–4 very short in the middle, fifth excessively reduced in length, almost linear; the sixth in the middle as long as the preceding three conjointly, with a large central impression, the terminal as long as the sixth but narrower. Posterior coxæ prominent, the trochanters subtriangular and acutely produced or medially spiniform behind.

The foveate metasternum and penultimate ventral segment, the spiniform posterior trochanters, abbreviated basal ventral segments, and the structure of the middle pair of tibiæ are good distinguishing characters.

♂. Length 1½; breadth ½ mm.

Mount Pirongia, December 1909. A single male is all I could find.

3384. *Zealandius fulgens*, sp. n.

Subdepressed, moderately broad, quite glossy; castaneo-rufous, legs and antennæ somewhat fulvescent, tarsi and palpi testaceous; pubescence yellowish grey; the punctation obsolete.

*Female.—Head* as large as the thorax, gradually narrowed before the minute eyes, feebly rounded behind them, with obtuse hind angles, its sculpture rendered indistinct by the pubescence; the foveæ moderate, not deeply prolonged anteriorly, antennal tubercles small and distant. *Thorax* broadly cordate, median groove rather deep and broad, extending from the front to the deep, angular, basal fossa; lateral foveæ deep and subrotundate, not distinctly united to the central fossa; the sides in front of them appear swollen. *Elytra* nearly a third longer than the thorax, a little broader than they are long, gradually narrowed towards the base, with rounded shoulders; the sutural and dorsal striæ broad, deep near the base, rather shallow near the apices, the intervals convex, lateral striæ indefinite. *Hind body* as long as the elytra, basal three segments equal, the others deflexed.

*Antennæ* hardly as long as the head and thorax, moderately stout; basal joint rufous, cylindric, its length nearly double the breadth, second oblong-oval, much shorter than the first but as thick, third small and obconical; joints 4–8 small and moniliform, the fifth and seventh only slightly larger; ninth rather broader than eighth, but not as large as

the transverse tenth; the terminal large, conical, and acuminate, about as long as the preceding three combined.

*Male.—Underside* shining chestnut-red, with fine yellowish pubescence. Head foveate behind. Prosternum rather short, carinate along the middle. Metasternum with a subrotundate depression. Intermediate and posterior trochanters spined. Abdomen with segments 2–6 decreasing in length, the second medially convex and with a linear impression towards each side, the frontal suture of the third open and rather deep, with a small central depression within it; sixth slightly shorter than fifth, widely emarginate, the supplementary obtusely triangular.

The male characters of the North Island *Z. raffrayi* and *Z. illustris* are sufficiently distinctive. The female is obviously more glossy, broader, and with thicker legs than the same sex of *Z. usitatus*, 3050, from Broken River. The head is broader behind the eyes. The thorax is evidently broader, with much deeper impressions, and the elytral striæ are deeper. The antennæ are longer and stouter, with larger tenth and eleventh joints.

Length 2; breadth $\frac{2}{3}$ mm.

Greymouth. Two specimens from Mr. J. H. Lewis, the male unfortunately without the middle pair of legs.

### Alloplectus, gen. nov.

Body moderately elongate, subdepressed. *Head* shorter than the thorax, as broad in line with the eyes, obliquely narrowed anteriorly, genæ nearly straight, with obtuse angles; bifoveate in line with the front of the eyes, and with a median groove behind. *Eyes* rather large but only slightly convex, situated just behind the middle, extending downwards and occupying a larger space underneath than above. *Antennal tubercles* small, moderately elevated, subcontiguous. *Thorax* longer than broad, rounded, and slightly wider before the middle than at the base; without discoidal impressions, but with a well-marked linear impression in front of the base uniting with the elongate lateral foveæ. *Elytra* oblong, about twice the length of the thorax, slightly narrowed towards the base; sutural striæ deep, punctiform at the base, the dorsal also deep but only moderately elongate. *Hind body* much shorter than the elytra, the basal three visible segments margined, the first rather longer than the second, horizontal, the others deflexed, but not abruptly.

*Tarsi* with single claws, basal joint of the posterior small, the next thick and nearly twice the length of the third.

*Maxillary palpi* small, first joint invisible, second elongate and slightly curved, third globular, fourth fusiform. *Antennæ* rather distant at the base, the exposed portion of the basal joint scarcely longer than broad, second as stout, oviform; joints 3–8 small and moniliform, eighth rather shorter than seventh; the ninth very short, slightly broader than the preceding, tenth strongly transverse, nearly double the width of the ninth; terminal large, as broad as the penultimate, as long as joints 7–10 combined, conical and acuminate, and bearing very slender elongate pubescence.

*Male.—Prosternum* not carinate. *Metasternum* elongate, convex, with a median impression behind. *Abdomen* with the basal segment covered by the femora, bearing elongate pubescence behind; segments 2–5 gradually decrease in length, fifth slightly but widely incurved behind; sixth nearly twice the length of the fifth, deeply and somewhat angularly emarginate at the extremity; seventh distinct, subrotundate, with a slight median fissure or groove along its hinder portion.

The male characters are derived from a specimen found at Tarukenga, near Rotorua; the other part of the description from the original specimen obtained at Maketu, Hunua Range.

This genus is instituted for the more systematic location of my *Euplectus claviger*, 2483, which in 1893 I placed by itself as the exponent of a new genus in Section VIII. of the New Zealand Euplectini (Ann. & Mag. Nat. Hist. ser. 6, vol. xv. p. 71). A third individual having been found, I sent it to M. Ach. Raffray, who confirms my opinion, and states that this new genus comes near his *Euplectodina*, which occurs at Siam and Java.

### 3385. *Alloplectus picipennis*, sp. n.

Subdepressed, elongate, narrow, glossy; light chestnut-red, elytra somewhat piceous, legs and antennæ testaceous; pubescence decumbent, greyish, scanty on the head and thorax.

*Head* shorter than the thorax, nearly as broad, with rounded hind angles; bifoveate in line with the front of the rather large eyes, and with an indistinct longitudinal stria behind. *Thorax* only slightly longer than broad, oviform, rounded and widest at the middle, more narrowed towards the front than behind; with a transverse impression near the

base connecting the small, shallow, subrotundate lateral foveæ with the small punctiform central one. *Elytra* oblong, rather broader and obviously longer than the thorax; with well-marked sutural striæ, which are foveiform at the base, as are the distinct, moderately elongate, dorsal impressions. *Hind body* as broad as the elytra, but quite a third shorter, segments 3–5 deflexed, the second as long as the first, the latter slightly medially impressed at the base.

*Antennæ* scarcely as long as the head and thorax, second joint nearly oviform, hardly longer than broad, as large as the visible portion of the first; the others, including the large distinctly pubescent terminal one, similar to those of *A. claviger*.

This species may be recognized at once by the dark, elongate, glossy elytra, impressed basal dorsal segment, and shorter antennæ. *A. claviger* is of an almost uniform light chestnut-red, and is without any perceptible central fovea in the transverse depression of the thorax.

Length quite 1; breadth $\frac{1}{3}$ mm.

Howick, near Auckland. I have only succeeded in finding one specimen.

3386. *Alloplectus subcœcus*, sp. n.

Nitid, light castaneo-rufous; elytra and abdomen slightly darker, yet quite rufescent and rather dull; legs and antennæ somewhat fulvescent; pubescence greyish, depressed and distinct.

*Head* nearly as long as the thorax, subtrigonal, its hind angles obtusely rectangular, indistinctly punctate, the frontal foveæ and linear basal impression rather shallow. *Eyes* minute. *Thorax* suboviform, rounded and widest before the middle, only slightly longer than broad, its punctation shallow and not close, but quite discernible under a good lens; lateral foveæ indistinct, the central one somewhat angulate and forming part of the transverse basal impression. *Elytra* rather broader and slightly longer than the thorax, feebly curvedly narrowed towards the base; dorsal impressions punctiform at the base, rather small and indefinite, sutural striæ linear, also punctiform at the base. *Hind body* as broad and nearly as long as the elytra, the first segment with a short median basal depression and equalling the second in length, the others deflexed.

*Antennæ* nearly as long as the head and thorax, second joint subrotundate, as thick as the short exposed portion of the basal one; third just perceptibly longer than broad,

small and subobconical; joints 4–8 small, subglobular, and short; ninth a little broader than eighth, but hardly more than half the width of the transverse tenth; the terminal large, rather short, broadly conical, subacuminate, finely but thickly pubescent, and nearly double the breadth of the tenth.

In all three species the antennal structure is almost precisely similar, so, too, is the size of the insects. This species may, however, be considered aberrant, owing to the subtrigonal head and minute eyes. It is rather narrower than the others, and may be distinguished by the punctation and less definite intrahumeral impressions.

Length quite 1; breadth $\frac{1}{3}$ mm.

Retaruke Forest, near Erua. I found a solitary individual amongst decayed leaves collected for me by Capt. Whitehorn in April 1910.

### Kenocœlus, gen. nov.

Body only moderately elongate in the male; in the female narrower, with the elytra somewhat rounded at the sides and more narrowed towards the base and the hind body more horizontal.

*Head* quadrate, much shorter than the thorax, plane above, short and vertical in front, without antennal tubercles, vertex bifoveolate; the lower surface at each side is slightly dilated in front of the eyes, and prolonged forwards as a process which, in front, is slightly separated from the side; just above this there is a cavity in which the maxillary palpus is accommodated and almost entirely concealed from above. *Thorax* longer than broad, with a sulciform median fossa near the base and a fovea at each side; these are more or less indefinitely united, according to the point of view, by a linear transverse impression. *Elytra* subquadrate, obviously broader than the thorax, with distinct sutural striæ and a short foveiform impression near each shoulder. *Hind body* rather shorter than the elytra, its first and second visible segments broadly margined, horizontal, and subequal, the third with thinner margins, this and the following two gradually deflexed.

*Legs* stout and elongate; tibiæ arcuate externally; basal joint of the tarsi minute, the intermediate nearly double the length of the third, with a single claw.

*Antennæ* 11-articulate, as long as the head and thorax, stout, of nearly the same thickness throughout, inserted within the upper part of the cavity occupied by the palpi;

the exposed portion of the basal joint only about half as long as it is broad; second and third joints obconical, hardly longer than broad; joints 4–8 differ but little, all broader than long, ninth and tenth a little larger, eleventh conical and subacuminate, longer than the penultimate.

First *ventral segment* short and covered by the femora, the next unevenly convex in the middle, third quite as long as the second, with a basal depression at each side of the middle; fourth and fifth short, the latter widely but not deeply incurved behind; sixth with a deep, semicircular, apical emargination, which is occupied by the flat, broadly oval, supplementary segment.

*Female.*—Second and third ventral segments nearly equal, fourth and fifth much shorter, sixth large, obtusely triangular.

A written copy of the description of the male and a specimen of the female have been forwarded to M. Ach. Raffray. He kindly informs me that this exceedingly curious new genus belongs to a new and very isolated section of the Euplectini.

### 3387. *Kenocœlus dimorphus*, sp. n.

Shining, rufescent, tarsi and palpi yellow, terminal joint of antennæ fulvescent; sparingly clothed with decumbent greyish pubescence.

*Head* quadrate, slightly flattened and quite obsoletely bifoveolate in front, very finely and distantly punctate, with a pair of small, distant, interocular foveæ. *Eyes* moderately large and prominent, situated behind the middle. *Thorax* nearly twice as long as broad, widest and somewhat rounded just before the middle, slightly sinuate behind, very finely and distantly punctate, with a slight antebasal impression connecting the rather shallow lateral foveæ and the sulciform median depression. *Elytra* longer and broader than the thorax, a little narrowed towards the base, finely punctate, with rather fine sutural striæ, the intra-humeral impressions rather short and shallow.

*Female.*—Eyes very small and indistinct. The body less nitid and darker, elytra more rounded at the sides and narrower at the base, and the hind body more horizontal and therefore apparently longer.

♂. Length $1\frac{2}{3}$; breadth nearly $\frac{2}{3}$ mm.

♀. Length nearly 2; breadth $\frac{1}{2}$ mm.

Greymouth. One male and two females, discovered by Mr. J. H. Lewis, somewhat damaged unfortunately.

## LXXVII.—*New Species of* Geometridæ.

By Louis B. Prout, F.E.S.

### Subfam. *Œnochrominæ*.

*Hypographa bathrosema*, sp. n.

♂. 40 mm.—Face without horny prominence (? damaged). Palpus with third joint rather long; blackish, somewhat mixed with white. Antennal shaft ferruginous brown; pectinations somewhat more ochreous, long, decreasing; last 10 or 12 segments merely serrate-dentate. Thorax blackish, much mixed with white except posteriorly. Abdomen grey irrorated with fuscous. Fore wing with costa nearly straight, subconcave; termen strongly and rather regularly dentate; venation normal, stalk of $SC^{4-5}$ separate from $R^1$, $R^2$ from well below middle of DC; blackish fuscous, somewhat irrorated with white, especially in proximal half of median area; a white patch at base, slightly sprinkled with fuscous and containing longitudinal black marks from base, namely, a dash 2 mm. in length anteriorly to cell, a rather longer one posteriorly to cell, and an irregularly triangular blotch 3 mm. in length occupying the space between submedian fold and $SM^2$; antemedian line from one-third costa to nearly one-half inner margin, whitish, lunulate-dentate, the teeth pointing basewards on M and $SM^2$; accompanied distally by a black line which thickens into a broad shade anteriorly; postmedian line deeply sinuate basewards from $R^1$ to $R^3$ and below $M^2$; preceded by a black line; cell-spot elongate, crescentic, blackish, not distinct; subterminal line white, zigzag, somewhat interrupted; terminal area pale (rubbed on both wings); terminal line black. Hind wing with termen crenulate; base whitish as far as end of cell, thence light purplish fuscous marked with black towards inner margin; a weak, diffuse, dark dentate line at proximal margin of the dark area, absorbing the ill-defined, crescentic cell-mark; a postmedian dark line following the same course as that of fore wing; faint indications of a pale subterminal, most noticeable towards tornus; a fine black terminal line; fringe pale proximally, darker distally and broadly dark-marked at the ends of the veins. Under surface of fore wing light purplish fuscous, paler at inner margin, costal edge as far as the postmedian line blackish, marked with white, median and postmedian lines present; of hind wing whitish, coarsely irrorated with purplish and blackish fuscous, median

dark shade present, thickened towards costa, postmedian darker than above and followed by a diffuse dark cloud, which is least distinct towards the costa.

Kelmscott, West Australia, 27th May, 1909 (*G. F. Berthoud*). Type in coll. G. Lyell, Gisborne.

Nearly related to *H. incongrua*, Walk. List Lep. Ins. x. p. 353, but differing, apart from the wing-markings, in less prominent frons and somewhat longer third joint of palpus.

*Sarcinodes subvirgata*, sp. n.

♀. 60–63 mm.—Face grey, pinkish above. Palpus grey, sprinkled with pinkish, almost wholly pinkish beneath. Head and body concolorous with wings. Build very robust, as in *subcarnea*. Fore wing pink, slightly mixed with grey, costal edge narrowly whitish, irregularly marked with grey; antemedian line very faint, somewhat darker from costa to SC, where it is sharply angled, subsequently marked with a fuscous dot on M and on SM; median line more distinct, lunulate-dentate, angled near costa; postmedian firm, dark olive-fuscous or blackish, running almost straight from apex to inner margin at three-fifths; the intermediate area mostly filled in with red-brown, gradually darkening and becoming more mixed with olive as it approaches the submedian; faint traces of a deeply lunulate-dentate subterminal pale line, distally to which the ground-colour is again somewhat red-brown shaded; extreme termen and fringe dark red-brown. Hind wing with the median line becoming antemedian, the postmedian crossing the wing at scarcely beyond middle; coloration much as in fore wing, but with stronger hoary dusting distally to postmedian, especially on the teeth of the subterminal. Underside of fore wing very variegated, pink and olive-grey, with sparse blackish scales, costal area in part paler, a thick, dark olive-grey subcostal line nearly to apex; an oblique cell-mark and distinct median line, the latter just beyond cell, touching posterior end of cell-mark and followed by some dark shades; a postmedian series of blackish vein-dots from costa at four-fifths, curved at first, but mostly running just proximally to the line of upperside; distal area somewhat darkened and slightly mixed with ochreous. Underside of hind wing with the dark shading increased, absorbing nearly all the wing, except the base, apex, and a narrow central band containing the series of black vein-dots; this central band shaded with pale ochreous, at least in the posterior half; a rather strong wash of deep ochreous near termen between $R^1$ and $R^3$.

Ninay Valley, Central Arfak Mountains, Dutch New Guinea, 3500 feet, November 1908 to January 1909. Type in coll. L. B. Prout. A second ♀, Fak-Fak, 1700 feet, January to February 1908, slightly more reddish above and slightly more ochreous beneath, but quite similar, also in coll. L. B. Prout. The type has a large dark olive spot behind postmedian on $R^3$ of each wing, of which there is no trace in the cotype.

*Leptoctenopsis uxorcula*, sp. n.

♀. 28 mm.—Very closely related to *melusina*, Prout, Gen. Ins. fasc. 104, p. 82, of which it may possibly be a form, though the fore wing appears to be slightly more squared at tornus; ground-colour paler, the antemedian line somewhat more curved, the postmedian paler, shaded proximally with pale yellowish and on fore wing sharply dentate outwards in the cellules on either side of $SC^5$.

Caracas, Venezuela. Type in coll. L. B. Prout.

*Corium hyperphyes*, sp. n.

♂. 43 mm.—Face black above (partly rubbed). Palpus whitish, ends of first and second joints black on outer side. Thorax and abdomen white, with some black spots dorsally. Wings white, subhyaline, with slight bluish reflection. Fore wing with apex acute, produced; costa to SC irrorated with fuscous; antemedian line from costa at well beyond one-third to termen at somewhat beyond one-third, curved anteriorly, consisting only of large irregular blackish spots on SC, M, and $SM^2$, and weaker ones on the folds; discal spot black; postmedian line from costa at four-fifths to inner margin at somewhat before two-thirds, consisting of black spots on $SC^5$, $R^{1-3}$, and $M^1$ (the last almost a dash), and black dashes, considerably further from termen, on $M^2$, $SM^{1-2}$, and inner margin; a faint, strongly lunulate-dentate subterminal line near distal margin, the teeth on the veins directed distad; a slender dark terminal line, and a series of large round black terminal spots between the veins; fringe white. Hind wing similar, without antemedian line. Underside with discal and terminal spots, the lines obsolete.

Mlanji Mountain, 6000–7000 feet, 1st May, 1910 (*S. A. Neave*). Type in coll. Brit. Mus.

Much larger than any previously known species of *Corium* or *Derambila*, and further distinct in the formation of the subterminal line.

In the fore wing $SC^1$ arises separate, not from the base of stalk of $SC^{3-5}$; after anastomosing very strongly with C it does not touch $SC^{3-4}$. The hind leg is long and slender.

Subfam. *Acidaliinæ*.

*Neosterrha cryptereuthus*, sp. n.

♂. 27 mm.—Face reddish, mixed with fuscous above; palpus reddish; head otherwise concolorous with wings. Fore wing slightly narrower (termen more oblique) than in *thetis*, Warr. Nov. Zool. vii. p. 158; similarly coloured and marked, the black cell-spot very large and almost round—much larger than in *thetis*. Hind wing not angled (scarcely even bent) at $R^3$; marked as in *thetis*, the two white cell-spots large. Fore wing beneath almost uniform bright red, only the extreme inner marginal edge concolorous with hind wing; postmedian line marked in deeper red. Hind wing beneath pale greenish ochreous, terminal and subterminal lines red.

San Antonio, W. Colombia, 5800 feet, December 1907 (*M. G. Palmer*). Type in coll. L. B. Prout.

Warren mentions what is evidently this species as a variety of *thetis*, but does not allude to the difference of shape, nor to the large cell-spot. It seems to be a quite distinct species.

*Acidalia manifesta*, sp. n.

♂ ♀. 20–24 mm.—Size, colour, and aspect of *corrivalaria*, Kretschmer, but with the markings grey, or at most slightly ochreous grey, never clear ochreous; median shade of fore wing more oblique, reaching inner margin just before one-half, that of hind wing nearer base, well proximal to cell-spot, never crossing or markedly bending round it; postmedian line of both wings finer, not or at most very feebly denticulate; a diffuse grey shade distally to postmedian sometimes prominent; both cell-spots always strikingly large and distinct. Underside more weakly marked than upper (in *corrivalaria* the reverse is the case). Hind tarsus in male not much shorter than tibia—about three-fourths (in *corrivalaria* considerably less than one-half).

Tien-tsin, type (♂, 7th September, 1904) in coll. L. B. Prout, together with a series of both sexes, August–September 1904, June 1905 and ? 1906, all kindly presented by Mr. Percy Richards.

Variable in the strength of the markings, but always conspicuous in the bold, prominent discal spots.

*Hamalia subfuscicosta*, sp. n.

♂. 21 mm.—Face and occiput blackish fuscous; vertex whitish. Palpus slender, fuscous, pale beneath. Antennal shaft fuscous, at base whitish, cilia long. Fore and middle legs fuscous above. Wings glossy. Fore wing with termen strongly oblique; very light bone-colour; basal one-third of costa dark fuscous, costal area further with some fuscous speckling; lines very fine, brown; antemedian and median almost obsolete, the latter starting from a large dark spot at costa; postmedian from costa at nearly three-fourths, subterminal midway between this and termen, both starting from dark costal spots, strongly sinuous, the postmedian outangled on $R^1$, incurved between $R^1$ and $R^3$; no terminal line; fringe concolorous. Hind wing rather narrow, whitish bone-colour; $SC^2$ and $R^1$ stalked for one-half their length; all the four lines present, not very strong, irregularly lunulate-dentate, postmedian deeply incurved between $R^1$ and $R^3$. Underside of fore wing more suffused with fuscous, especially costally and terminally, the median and postmedian lines diffuse; inner margin of fore wing and whole of hind wing whitish, unmarked.

San Antonio, W. Colombia, 5800 feet, December 1907 (*M. G. Palmer*). Type in coll. L. B. Prout.

Subfam. *Larentiinæ*.

*Cambogia diversicosta*, sp. n.

♂. 22 mm.—Face red-brown; vertex grey. Antennal shaft grey, darker-spotted; pectinations normal. Thorax red-brown, patagia and base and tip of tegulæ ochreous grey. Fore wing red-brown; a broad ochreous-grey, reddish-marked costal streak, reaching to SC and to $R^1$, then running off to a point at apex; lines very fine, dark, indistinct except at costa; antemedian from costa at one-fifth, oblique outwards, acutely angled on SC, thence vertical to inner margin; followed by a diffuse pale shade, this again by a diffuse dark line; postmedian starting obliquely from costa at one-half, strongly excurved in anterior half of wing; a faint pale line following a similar course, 1 or 2 mm. nearer termen; cell-spot large, black; termen with indistinct dark spots between the veins; fringe red-brown, with pale yellowish line at base. Hind wing with termen waved, slightly toothed at $R^3$; cell-spot small, but very distinct; followed by first line, which is angled at separation of $M^1$ from $R^3$, and followed

shortly by a weaker, more diffuse line ; postmedian much as in fore wing. Underside rather paler, with indistinct lines ; cell-spots distinct, terminal spots more conspicuous than above.

San Antonio, W. Colombia, 5800 feet, December 1907 (*M. G. Palmer*). Type in coll. L. B. Prout.

Nearly related to *C. pallidicosta*, Warr. Nov. Zool. xiv. p. 241, of which it may possibly prove a form ; smaller, duller, the costa less conspicuously pale, the fringe apparently not pale yellow at the extremity (but slightly damaged), the hind wing less strongly toothed at $R^3$.

*Trichoclystis rhombipennis*, sp. n.

♂. 20 mm.—Head and palpus dull ochreous, the latter marked with fuscous along upper side. Antenna pale ochreous, spotted above with fuscous. Body pale ochreous, mixed with fuscous ; abdomen densely tufted with long hair beneath. Fore wing shiny (almost greasy-looking) ochreous grey, suffused along costa and termen with fuscous ; basal patch small, fuscous, widening costally ; median band fuscous, of uniform width, smooth-margined, its proximal edge from costa at almost one-third, very gently incurved, distal edge from costa at two-thirds, gently outcurved in costal half, here somewhat darkened ; obscure dark subterminal shading costally and between the radials ; terminal line dark, interrupted at vein-ends ; fringe grey, apparently dark-spotted at vein-ends (defective). Hind wing short, termen truncate from C to $R^3$, here bluntly right-angled, thence nearly straight (somewhat sinuate) to tornus ; pale grey, more tinged with ochreous in distal and inner marginal part ; faint indications of median, postmedian, and terminal dark bands starting from inner margin. Underside greyish, weakly marked, fore wing with faint curved postmedian line and faintly dark terminal shade, separated by a vague pale band.

San Antonio, W. Colombia, 5800 feet, December 1907 (*M. G. Palmer*). Type in coll. L. B. Prout.

Apparently referable to the genus *Trichoclystis* as defined by Warren (Nov. Zool. xi. p. 535), all the generic characters which he gives being well developed ; the agreement with *Tephroclystia* (*Eupithecia*) in venation is, however, confined to the fore wing (and probably the female hind wing—at present unknown) ; in the curious rhomboid male hind wing the cell is strongly produced *anteriorly* (the reverse of the form so common in Larentiid genera), $SC^2$ arises from the

anterior (upper) angle of this projecting arm, $R^{1-2}$ from a point at its posterior (lower) angle. The large hair-tuft on underside of fore wing is ochreous grey, not raven-black as in *peregrina*.

*Eupithecia albisecta*, sp. n.

♂. 24 mm.—Face whitish ochreous, vertex white; palpus long, dark above. Patagia and tegulæ marked with white. Abdomen ochreous, the second segment with a dark brown-black belt. Fore wing dull chocolate-brown; costa nearly to apex broadly cream-coloured, the extreme edge slightly fuscous tinged; median vein broadly whitish; an oblique double whitish line from middle of inner margin, angled about $R^1$ and retracted to costal streak; traces (especially at costa) of an interrupted white subterminal line; fringe nearly concolorous with wing. Hind wing rather paler, with the double whitish line straight and antemedian. Underside paler, with weak transverse lines (the postmedian diffuse) and dark cell-spot, that on fore wing the larger.

San Antonio, W. Colombia, 5800 feet, December 1907 (*M. G. Palmer*). Type in Coll. L. B. Prout.

Except for the totally different hind wing above, this species might be taken for a form of *E. pallidicosta*, Warr. Nov. Zool. xi. p. 533, which is certainly variable.

Subfam. *Geometrinæ*.

*Leuciris mysteriotis*, sp. n.

♂. 26 mm.—Apparently indistinguishable from large, unmarked examples of *L. fimbriaria*, Cram., except in the antennal ciliation, which is very much shorter, the longer (outer) series scarcely twice as long as width of shaft.

Porto Rico. Type in coll. L. B. Prout.

In erecting *L. beneciliata* (Ann. & Mag. Nat. Hist. (8) vi. p. 437) I unfortunately compared its male antennal ciliation with that of the present species instead of with true *fimbriaria*. I find the last-named agrees with *beneciliata*, so that it remains just possible (though not probable) that *beneciliata* is merely a local race of Cramer's species, distinguished by the much more highly developed transverse markings and narrower terminal spots (the latter distinction not noted in the original description). In any case, *mysteriotis* is a structurally valid species.

*Nephodia* (*Nipteria*) *admirationis*, sp. n.

♂ ♀. 45–49 mm.—Head and thorax grey, marked with fuscous. Palpus blackish. Abdomen grey, marked with fuscous at the segmental incisions. Fore wing shining grey, costal edge (more broadly at base) blackish, costal area, apical one-third (or more) of wing and terminal area to tornus irrorated with fuscous, especially at apex, where the effect of a fuscous cloud is produced; cell-spot moderately large, fuscous; a faint fuscous line discernible at about 5–6 mm. from termen; fringe blotched with fuscous at vein-ends. Hind wing wholly irrorated and mottled with fuscous, a rather large dark cell-spot and a dark dash on cell-fold, nearly as in *exclamationis*, Warr.; no line; fringe as in fore wing. Underside similarly but very much more darkly marked; hind wing with a blurred, curved postmedian line discernible.

San Antonio, W. Colombia, 5800 feet, November 1907 (*M. G. Palmer*). Type (♀) in Coll. L. B. Prout. Two females from same locality, December 1907, in coll. L. B. Prout. One male from same locality, 24th August, 1908 (*Fassl*), kindly presented by M. Dognin, who informs me that he has three or four other males agreeing with this, two of them rather larger, better-marked, with the postmedian line more distinct.

Closely related to *N. exclamationis*, Warr. Nov. Zool. xi. p. 547, but differs in having the wings somewhat narrower, darker, weaker-marked above (especially the postmedian line); underside with the same distinctions, in particular the hind wing uniformly dark, yet with the "exclamation" or "admiration" mark well expressed, its — generally longer. It would seem to be the insect described by Warren (Nov. Zool. xvi. p. 100) as *N. obeliscata* ♀, but it is quite distinct from the type (♂) and is now known to occur in both sexes.

*Nephodia* (*Nipteria*) *ægrotans*, sp. n.

♂. 35–39 mm.—Face and palpus ochreous brown; vertex pale ochreous grey. Antennæ grey, the shaft tinged with ochreous. Thorax and abdomen pale ochreous grey, in places whiter. Fore wing dirty white, costa to SC, apex rather broadly and termen except at tornus (narrowing off to a point posteriorly) smoke-grey; veins conspicuously darkened; a dark cell-mark; a dark streak from costa to $R^5$, 4 or 5 mm. distant from termen. Hind wing almost uniform whitish grey, with a small indistinct cell-spot. Underside

of fore wing similar to upper; of hind wing smoky, with darker cell-spot and curved postmedian line at 4 or 5 mm. from termen.

La Oroya, Rio Inambari, S.E. Peru, 3100 feet, January 1906. Type in coll. L. B. Prout. A second example from Pozuzo, E. Peru, also in coll. L. B. Prout.

The strong veining of the upper surface recalls *N. pieridia*, Warr. Nov. Zool. xii. p. 351, but the present species has the termen more regular in shape and differs in the underside, &c.

*Meticulodes triplilunata*, sp. n.

♂. 50 mm.—Related to *beatricaria*, Oberth., nearly like it in costal half of both wings above, the principal differences being in inner marginal half, as follows :—*Fore wing*: base wanting the ferruginous-brown patch and its ochreous boundary-line; median area darker and much more uniform than in *beatricaria*, its proximal edge obliquely *curved*, reaching inner margin nearer base, its distal edge bounded by *three violet-whitish lunules*, their convexity directed distad; the succeeding shade delicate grey-violet, entirely without red admixture; black terminal shade narrow and only reaching to $M^1$. *Hind wing*: tornal markings black, not red, narrower than in *beatricaria* and bounded proximally by a *thick white* line, which bends rather sharply away from termen after $M^2$, and is very faintly traceable across the wing almost to costa. On the under surface the bright ferruginous shades of *beatricaria* are entirely wanting, the fore wing being shaded with reddish grey at apex (without the three white spots of *beatricaria*), the hind wing broadly with rich ochreous brown from apex to near tornus; a small black tornal patch on hind wing, bounded proximally by an ill-defined whitish patch.

Naranjito, Rio Dagua, W. Colombia, 3900 feet, June 1908. Type in coll. L. B. Prout. I have also seen a specimen from Costa Rica in Coll. W. Schaus.

*Lobopalta antonia*, sp. n.

♂. 46–50 mm.—Head and body concolorous with wings; palpus pale at extreme tip. Legs conspicuously marked with white patches, especially at end of tibiæ; spurs banded, blackish and white. Fore wing shaped as in *latrata*, Guen., except that the anterior half of termen is less absolutely smooth; pinkish brown, irrorated with olive-brown and with scattered black dots; antemedian line nearly as in *latrata*, but more sharply angled on $SM^2$, mixed of whitish

and olive, edged distally with blackish at costa and inner margin, very faintly with grey between; cell-spot blackish, ringed with pale olive; a curved median dark shade from costa beyond this, as in *latrata*; postmedian line starting from a pale spot at costa beyond four-fifths, sharply angled at $SC^5$, then rather oblique inwards, nearly straight, gently excurved in submedian area, olive, weak, but emphasized by whitish dots on veins and by proximal dark shading at costa and inner margin; fringe mostly reddler, but olive and pale-tipped in the sinus between $M^1$ and $M^2$. Hind wing similarly coloured, the brown tint predominating proximally, the pinkish distally; costa as far as $SC^2$ and termen from apex to across $R^1$ mostly white; a faint median and a moderately distinct postmedian line formed nearly as in *latrata*, but the latter darkened on the veins and accentuated by whitish vein-dots, slightly incurved in submedian area; some obscure subterminal clouding; fringe mostly reddish. Underside very like that of a strongly marked *angulosa*, Cram. (*caninata*, Guen.), the postmedian olive line rather better defined and more regular, the median shade of hind wing rather slighter, fringe without dark dots.

San Antonio, W. Colombia, 5800 feet, December 1907 (*M. G. Palmer*). Type and cotype in coll. L. B. Prout. M. Dognin possesses an example from Loja, Ecuador, which Mr. Druce many years ago, by mistake, determined for him as *succedens*, Walk. (a pure synonym of *latrata*). The hind wing beneath is particularly unlike that of *latrata*.

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LXXVIII.—Paraceratherium bugtiense, *a new Genus of* Rhinocerotidæ *from the Bugti Hills of Baluchistan.—Preliminary Notice.* By C. Forster-Cooper, M.A., University Demonstrator in Comparative Morphology, Cambridge.

[Plate X.]

The type species of this new genus is found in the Upper Oligocene deposits of the Bugti Hills in Baluchistan. The material is somewhat fragmentary, though enough has been obtained to warrant the formation of a new genus for its reception, the generic characters relied upon being the very unusual position and shape of the two lower incisors, which

in these respects differ from those of any other described form of rhinoceros.

The specific name *bugtiense* is given for the reason that the specimen is referred, provisionally at all events, to the upper teeth described by Pilgrim as *Aceratherium bugtiense* (Rec. Geol. Surv. India, vol. xl. part 1, 1910).

The material on which this new genus is founded consists of a moderately complete lower jaw with all the teeth present on each side (Pl. X.). Unfortunately the jaw belonged to an exceedingly old individual, and the premolars and molars are all much worn, so much so that in the second and third molars the plane of wear has reached a level lower than the cingulum. Enough is present, however, to show that the teeth are of the Rhinocerotid type in general character and may be compared with those of *Aceratherium*.

The general measurements of the jaw are :—

| | cm. |
|---|---|
| Extreme length from tip of procumbent incisor to back of ramus | 72·0 |
| Approximate height of ramus | 31·0 |
| Transverse width of condyle | 14·0 |
| Length of premolar-molar series | 32·5 |

The dental formula is :—I. $\frac{?}{-}$, C. $\frac{?}{0}$, Pm. $\frac{?}{3}$, M. $\frac{?}{3}$.

The measurements of the teeth are :—

| | cm. |
|---|---|
| Incisor, length of enamel crown | 5·7 |
| „ width at base | 3·4 |

| | Length. cm. | Breadth. cm. |
|---|---|---|
| Pm. 2 | 2·9 | 1·8 |
| Pm. 3 | 4·8 | 3·7 |
| Pm. 4 | 5·7 | 4·5 |
| M. 1 | 5·8 | 4·5 |
| M. 2 | 7·0 | 4·5 |
| M. 3 | 7·9 | 4·9 |

With the exception of the first the premolars are large, and the fourth is practically as large as the first molar. The front premolar shows very little sign of wear, only the enamel at the extreme top being worn away.

Owing to the position of the incisors, unique in this order, the lower border and front end of the upper part of the ramus show a peculiar outline. Beneath the molars the contour is flat (in the actual specimen it is rather concave, but this seems to be due to crushing). At the level of the hind end

of the last premolar the ramus shows its greatest depth, and then begins to slope upwards to a point some 4½ cm. beyond the front border of the mental foramen (which underlies the front premolar); here the ramus turns downwards a little and contains the stout root of the incisor.

On the upper surface in front of the leading premolar the border of the ramus forms a sharp edge which runs forwards for about 4½ cm.; it then swells out a little and turns abruptly down to the incisors.

The symphysis is 15½ cm. long and reaches to a level exactly at the middle of the last premolar, where the width between the rami, measured from the inside of these teeth, is 10 cm.

The chief peculiarity of the jaw lies in the shape and position of the single stout incisor in each ramus. These teeth lie at the extreme front, closely apposed at their bases and slightly divergent at their tips. The section for about 3½ cm. from the tip is roughly circular; on the outer side the surface of the tooth runs back in a straight line, on the inner side and at rather a low level a ridge arises which ends in a swelling apposed to a similar process from the opposite tooth (Pl. X. fig. 2). The two incisors are closely pressed together at this point and the two edges run back in a straight median line to the symphysis.

It is extraordinary that the incisors show no sign of wear in this specimen, seeing that the other teeth, with the exception of the one premolar, are practically worn down to the socket. It is probable that the specimen was a female, and the occurrence of rather larger incisors showing distinct signs of wear on the inner side of the tip supports this view, which is of some importance in considering the possible association with this species of other bones found in the same locality *. The great stoutness of the roots of these incisors is noticeable; a separate specimen (fig. 1 *a*, p. 714) showing signs of wear measures:—

| | cm. |
|---|---|
| From tip of tooth to end of the enamel outside .... | 5·9 |
| Greatest width of the enamel at base ..... | 5·5 |
| Greatest width of root ..... | 5·6 |
| Length of root ..... | 10·0 |

In addition to the specimen described above are two frag-

* Pilgrim (Rec. Geol. Surv. India, vol. xxxvii. part 2, pl. iv.) has figured and described two such teeth as the upper incisors of *Bugtitherium*.

ments of mandibular symphyses which belong in all probability to the same species. One of these fragments, as far as it goes, shows no great difference from the type; the other,

Fig. 1 *a*. Fig. 1 *b*.

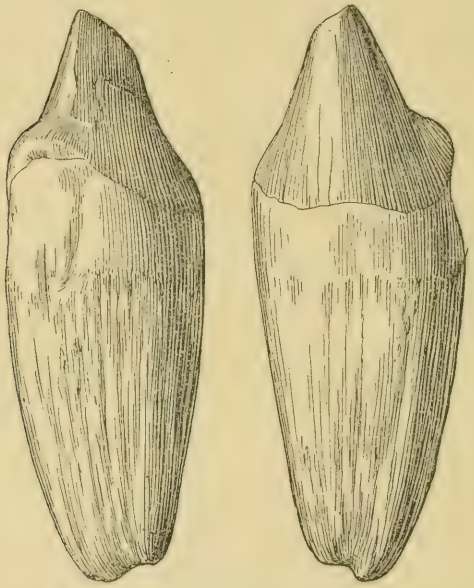
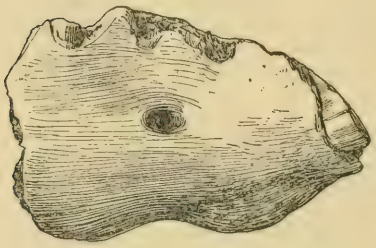


Fig. 1 *a*.—Inner surface of incisor.
Fig. 1 *b*.—Under surface of incisor.

Fig. 2.



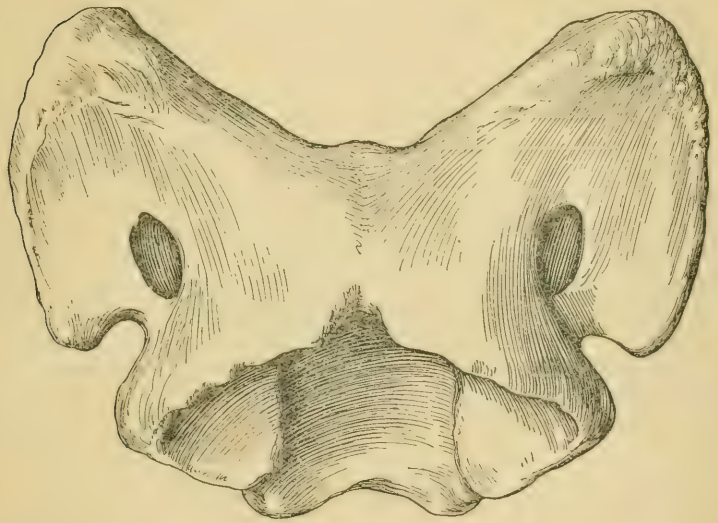
Portion of ramus attributed to *P. bugtiense*.

however, a symphysis, together with the roots of the two incisors and sockets for some of the premolars, differs in having a swelling in the central line on the underside of the

ramus just beyond the level of the mental foramen at a point where there is a slight concavity in the type (fig. 2). The diameter of the roots of the incisors is rather larger than in those of the type, and it is possible that this fragment belongs to a larger male of the same species—at any rate, it is best to refer it here until further material proves the contrary.

From the same locality come certain vertebræ and foot-bones which are provisionally referred to this species. Among them is chiefly noticeable an atlas (fig. 3) of extraordinary size, far too large for the specimen described above,

Fig. 3.



Atlas, upper surface.

but possibly belonging to a very large male, since the type is supposed to be a female. The measurements of this bone are as follows, and the measurements of an atlas of *R. bicornis* are given for comparison :—

| | *P. lugtiense.* | *R. bicornis.* |
|---|---|---|
| | cm. | cm. |
| Extreme width from wing to wing .... | 47·5 | 28·5 |
| Depth of wing ..... | 24·0 | 11·0 |
| Extreme width of condylar surface .... | 27·4 | 13·7 |

The edges of the wings are much roughened for the attachment of muscles. The vertebrarterial canal is similar to that

of *Rhinoceros*, but at the front end of the wing on the under side is a large foramen leading into a wide and deep cavity. This space communicates with the exterior by a large foramen on the hinder part of the upper border of the wing. The vessel occupying this cavity ran over a deep notch in the front of the wing. In *R. bicornis* this notch is represented by a foramen confluent with the upper foramen of the vertebrarterial canal, while the hinder foramen is represented by a small foramen on one wing and a very small and almost obsolete one on the other. The object of the large cavity so slightly represented in *R. bicornis* was probably to secure lightness in an unusually heavy bone.

Another large cervical vertebra was found equalling the atlas in size; also a large astragalus of Perissodactyl type and several other foot-bones. These will be described later on, when it is hoped further material will be forthcoming.

Two fragmentary skulls from the same locality may be noticed here, one of them with the series of premolars and molars complete. They seem to be referable to *Aceratherium bugtiense*, Pilgrim (*loc. cit.*). Seeing, however, that fragments of skulls and upper teeth of this form are fairly common, while, except for the lower jaw just described, nothing of corresponding size has so far been found, it seems possible that they are the upper and lower parts of the skull of one species. Of the many foot-bones collected there is a large gap in size between those of various species of ordinary sized Rhinocerotidæ and a single large and heavy form to which all these numerous fragments belong.

EXPLANATION OF PLATE X.

*Fig.* 1. *Paraceratherium bugtiense.* Right half of ramus.
*Fig.* 2. Ditto. Upper surface of front portion of ramus.

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## LXXIX.—*Descriptions of some new Species of Heterocera, mostly from Tropical South America.* By Herbert Druce, F.L.S. &c.

### Fam. **Syntomidæ.**

*Homœocera watkinsi*, sp. n.

*Male.*—Head and antennæ black; collar white; tegulæ and thorax black, the base of the thorax white; abdomen metallic green, four yellowish-white spots on both sides of

the abdomen, the underside of the abdomen white, with two red spots on either side; legs black and white. Primaries hyaline, the veins, the base, a spot at the end of the cell, and a large spot on the outer margin below the apex all black: secondaries hyaline, the veins, a spot at the end of the cell, and the outer margin edged with black, the inner margin broadly snow-white.

Expanse $1\frac{3}{4}$ inch.

*Hab.* South Peru, Uruhuasi, 7000 feet (*Mus. Druce*).

Allied to *Homœocera garleppi*, Rothsch.

Fam. **Hypsidæ.**

*Pericopis brunnea*, sp. n.

*Male.*—Head, palpi, antennæ, thorax, tegulæ, and legs black; collar spotted with yellow; abdomen black, the underside yellow, the sides sordid yellow. Primaries dull brown to beyond the middle, the outer half pale brown, the apex and outer margin blackish brown: secondaries blackish brown; a submarginal indistinct reddish-brown line extends from the apex to the anal angle; the fringes of both wings black. Underside: primaries blackish brown; a pale reddish-brown band crosses the wing near the apex; a pale brown spot at the end of the cell and three pale brown streaks close to the anal angle: secondaries blackish brown, the costal margin reddish brown; a large pale brown spot beyond the cell; the reddish-brown submarginal band the same as above, but more distinct and divided near the middle; the fringe black.

Expanse 3 inches.

*Hab.* East Ecuador, Baños, Rio Pastaza, 5000–7000 feet (*Mus. Druce*).

Very distinct from any species known to me, but nearest *Perecopis hodeva*, Druce.

Fam. **Cyllopodidæ.**

*Darna grandis*, sp. n.

*Male.*—Head, antennæ, palpi, collar, tegulæ, thorax, abdomen, and legs all black. Primaries black, shot with metallic blue at the base and partly along the inner margin; a large square-shaped semihyaline spot at the end of the cell and two spots beyond, the first small, the second large, the three spots forming a band; the fringe black: secondaries black, the base and inner margin shot with bright blue, the costal

margin chrome-yellow from the base almost to the apex; a chrome-yellow streak extends from the base to the middle of the wing. Underside greyish black, with the yellow markings wider.

Expanse $1\frac{1}{2}$ inch.

*Hab.* East Ecuador, Baños, Rio Pastaza, 5000–7000 feet (*Mus. Druce*).

Allied to *Darna splendens*, Druce, from Costa Rica.

*Darna palmeri*, sp. n.

*Male.*—Head, antennæ, collar, tegulæ, thorax, abdomen, and legs blue-black. Primaries black, the inner half steel-blue; a large, orange-red, square-shaped spot beyond the cell on the costal margin; the fringe black: secondaries black, the costal half of the wing grey, the fringe black. Underside very similar to the upperside, but paler in colour and the orange-red spot rounder.—*Female* very similar to the male, but paler in colour, and the orange-red spot considerably larger; the hind wing steel-blue, bordered with black.

Expanse, ♂ $1\frac{3}{4}$, ♀ $1\frac{3}{4}$ inch.

*Hab.* East Ecuador, Rio Verde, Rio Pastaza, 5000 feet (*Mus. Druce*).

*Darna* (?) *furonia*, sp. n.

*Male.*—Head, antennæ, palpi, collar, tegulæ, thorax, abdomen, and legs black, three white dots on the collar. Primaries and secondaries dark chrome-yellow; the costal margin, apex, and outer margin of both wings edged with black; a narrow black band crosses the primaries about the middle from the costal to the inner margin. The underside the same as above.

Expanse $1\frac{1}{2}$ inch.

*Hab.* Eastern Ecuador, Baños, Rio Pastaza, 5000–7000 feet (*Mus. Druce*).

*Iosiomorpha elisa*, sp. n.

*Male.*—Head, antennæ, palpi, collar, tegulæ, thorax, abdomen, and legs black. Primaries black, with a wide yellow streak extending from the base below the cell almost to the outer margin; it is widest at the base and goes to a point at the end of the streak; the fringe black: secondaries pale yellow, narrowly edged with black on the costal and outer margin; the hind margin broadly bordered with black. Underside very similar to the upperside.

Expanse 2 inches.

*Hab.* East Ecuador, Baños, Rio Pastaza, 5000–7000 feet (*Mus. Druce*).

Fam. **Lasiocampidæ.**

*Dirphia alba*, sp. n.

*Male.*—Head yellow, antennæ black; collar, tegulæ, and thorax grey; abdomen white, the second segment from the base and the anus bright yellow; legs dark grey. Primaries white, the veins brown; a curved brown line from the costal margin at the base extending to about the middle of the inner margin; a straight brown line crosses the wing from the costal margin to the anal angle; the apex and two-thirds of the outer margin heavily clouded with blackish brown: secondaries snow-white, the costal and outer margin edged with brown, the fringe white. Underside of both wings white, the veins and apex of the primaries blackish brown.

Expanse 3 inches.

*Hab.* E. Ecuador, Alpayacu, Rio Pastaza, 3600 feet (*Mus. Druce*).

Fam. **Noctuidæ.**

Subfam. *Hadeninæ.*

*Polia albostriata*, sp. n.

*Female.*—Head and antennæ black; collar and thorax clothed with red and grey hairs; tegulæ white, edged with red hairs; abdomen greyish at the base, the anal segments black; the legs and underside of the thorax reddish brown. Primaries black; a white ring in the cell, below which are two white spots; a submarginal row of elongated white streaks extends from the apex to the anal angle; the fringe alternately black and white: secondaries pure white. Underside: primaries black, with the spots as above, but more indistinct: secondaries greyish white.

Expanse $1\frac{3}{4}$ inch.

*Hab.* S. Peru, Acopampa, 11,500 feet (*Mus. Druce*).

Subfam. *Sticoptherinæ.*

*Lophoptera semirufa*, sp. n.

*Male.*—Head, collar, and thorax reddish brown; antennæ, abdomen, and legs black. Primaries: the basal half of the wing reddish brown, edged with a grey line crossing the

wing from the middle of the costal margin almost to the anal angle; the outer half of the wing dark grey, mottled with darker spots; a rather large black spot at the apex: secondaries, the basal half hyaline, the veins all black; the apex, outer and inner margin broadly black; the fringe greyish. Underside of the primaries black; the secondaries as above.

Expanse $1\frac{1}{4}$ inch.

*Hab.* West Africa, Bitje, Ja River, Cameroons, 2000 feet, dry season (*Mus. Druce*).

Fam. **Crambidæ**.

*Crambus* (?) *gigantilla*, sp. n.

*Male.*—Head, antennæ, collar, and thorax white; palpi and sides of the head reddish brown; abdomen and legs black; anal tuft with a few greyish hairs. Primaries greyish white, thickly irrorated with minute black dots; the costal margin reddish brown from the base to beyond the middle; the fringe grey and white: secondaries pale greyish brown, the fringe white. The underside of both wings uniformly dark brown; the fringe white.—*Female.* Head, palpi, antennæ, and collar reddish brown; tegulæ and thorax yellow, abdomen and legs black. Primaries streaked with grey and yellow, the costal margin from the base to the apex reddish brown, the fringe grey: secondaries pale greyish brown, the fringe grey and white. Underside of both wings dark brown, the fringe white.

Expanse, ♂ $2\frac{1}{2}$, ♀ $2\frac{3}{4}$ inches.

*Hab.* South Peru, Acopampa, 11,500 feet (*Mus. Druce*).

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## LXXX.—*Three new Rodents from Kan-su.*

By Oldfield Thomas.

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Specimens representing the three following new species have been obtained in Kan-su by Dr. J. A. C. Smith, already well known as a mammal collector by his work with Mr. Malcolm Anderson. They have been acquired for the National Museum by the kind help of the Hon. N. Charles Rothschild.

*Myospalax smithii*, sp. n.

A fairly large species of the *fontanieri* group with a

median sagittal crest, small teeth, and two re-entrant angles on $m^3$.

Size rather less than in *M. fontanieri*. Colour dark drabby, the belly little lighter; crown blackened in the type. Hands and feet whitish, well-haired, but the hairy part terminating at the bases of the digits, the skin covering the bases of the claws naked. Tail proportionally rather short, dull greyish white.

Skull with the essential characters of the *fontanieri-cansus* group, in which the occipital region forms a ridged and projecting hump behind the transverse masseteric crests. Nasals about equalling the premaxillæ posteriorly. Interorbital region narrow, its edges, even anteriorly, rounded, not ridged as in all the other species of the group. Masseteric fossæ of the two sides with their inner ridges closely approximated, separated by a groove scarcely half a millimetre in breadth, and therefore practically forming a median sagittal crest. Transverse crest not immensely developed, and, as usual in this group, obsolete in the centre. Lateral crests on occipital hump well developed, but no median occipital crest present.

Molars small in proportion to the size of the skull, their structure as in *M. cansus*, except that there is a well-marked second re-entrant angle on the inner side of $m^3$.

Dimensions of the type (measured in the flesh) :—

Head and body 202 mm.; tail 41; hind foot 32.

Skull: greatest (condylo-nasal) length 50·3; condylo-incisive length 46·2; zygomatic breadth 34·6; nasals 18·6; interorbital breadth 7·3; breadth on transverse crest 30·4; palatilar length 22·8; palatal foramina 8·3; upper molar series (crowns) 10·2, (alveoli) 10·6.

*Hab.* (of type). 30 miles S.E. of Tao-chou, Kan-su. 10,000′. A specimen from Gumansa, Kan-su, collected by G. Grzimailo and received from the St. Petersburg Museum in 1892, is believed to be of the same species, but the diagnostic parts of the skull are broken away.

*Type.* Adult male. B.M. no. 11. 11. 1. 1. Original number 172. Collected 6th April, 1911, by Dr. J. A. C. Smith and presented by the Hon. N. Charles Rothschild.

The close approach of the two masseteric fossæ to each other in the middle line is a character quite unique in the genus. The rounded supraorbital margins, small teeth, and the two re-entrant angles on the inner side of $m^3$ also seem to distinguish this species from its allies.

*Myospalax rothschildi*, sp. n.

Size smallest of genus. Teeth minute.

Size of an adult male, as gauged by skull, rather less than in females of *M. cansus*, the smallest of the known species of the genus. Fur soft and fine; hairs of back 14–15 mm. in length. General colour above "drab-grey," the sides clearer, in parts approaching "écru-drab"; under surface scarcely lighter. Head not darkened, clearer grey. Hands and feet greyish white, hairy above except on the digits close to the claws. Tail fairly long, greyish along the top, whitish on sides and below.

Skull strongly built, depressed, its upper profile slightly concave over the front of the orbits. Zygomata widely spread, their middle portion angularly projected outwards, very different to the even rounded curve found in other species. Nasals falling just short of premaxillæ posteriorly. Supraorbital edges, masseteric ridges, both parietal and transverse, and occipital hump as in *M. cansus*, except that there is no median occipital ridge. Front edge of anterior zygomatic plate with scarcely any trace of the marked downwardly projecting ridge found in other species.

Incisors comparatively slender, the breadth of the upper pair together 3·6 mm. Molars exceedingly small, smaller in proportion to the skull than in any other species; their notches and angles as in *M. cansus*, except that, as in *M. smithii*, there are two internal re-entrant angles on $m^3$.

Dimensions of the type (measured in flesh) :—

Head and body 164 mm.; tail 45; hind foot 26.

Skull: greatest (condylo-nasal) length 40; condylo-incisive length 36·5; zygomatic breadth 28·2; nasals 15; interorbital breadth 7·6; breadth on transverse crests 24; palatilar length 12·8; palatal foramina 6·5; upper molar series (crowns) 7·6, (alveoli) 8·2; breadth of $m^1$ 1·6.

*Hab.* 40 miles S.E. of Tao-chou, Kan-su. 11,000′.

*Type.* Adult male. B.M. no. 11.11.1.2. Original number 194. Collected 11th April, 1911, by Dr. J. A. C. Smith and presented by the Hon. N. Charles Rothschild.

This striking little species is at once distinguished from all others by its small size, widely splayed zygomata, and small teeth. I have much pleasure in naming it in honour of its donor, to whose generous help the Museum is so constantly indebted.

It is very remarkable that three species of this genus, *M. cansus*, *smithii*, and *rothschildi*, should all occur so close together to the S.E. of Tao-chou. There is, however, no question as to their entire distinctness from each other.

*Microtus oniscus*, sp. n.

A small vole allied to *M. irene*.

Size decidedly smaller than in *irene*. Fur soft and fine, rather less woolly than in *irene*; hairs of back almost 10 mm. in length. General colour above lined hair-brown; below slaty, washed with greyish or drabby white; line of demarcation on sides rather well defined. Ears showing beyond the fur; coloured like the head. Hands and feet dull whitish; soles hairy, with six well-developed pads. Tail short; above drabby, proximally darkening to brown terminally, below white. Mammæ 2—2=8.

Skull lightly built, with slender muzzle and interorbital region; its upper outline not so flat as in *M. irene* and *millicens*. Interorbital space narrow, rounded above, without angles or ridges, though it might become ridged in the middle line in old age. Brain-case smooth, rounded, rather narrow, the antero-external corners scarcely perceptible. Palatal foramina fairly long. Posterior palate normal, its lateral pits fairly deep. Mesopterygoid fossa rather narrow. Bullæ proportionally small.

Teeth.—$M^1$ and $m^2$ without additional internal angles. $M^3$ with the usual four prisms and a posterior lobe, but the latter, instead of being C-shaped, is quite simple, with a single antero-internal angle only; there are therefore three internal and three external angles to the tooth. $M_1$, as in *M. irene*, with only four closed prisms, the normal fifth and sixth (counting from behind and including the posterior transverse lobe) open to each other and to the anterior space; the latter nearly cylindrical, its outer and inner angles scarcely developed.

Dimensions of the type (measured in flesh):—

Head and body 80 mm.; tail 25; hind foot 15·5; ear 11.

Skull: condylo-incisive length 22·2; condylo-basal length 22; zygomatic breadth 13; nasals 6·7; interorbital breadth 3·4; height of crown above alveolus of $m^1$ 7; palatal foramina 4·5; upper molar series (crowns) 5·2.

*Hab.* 40 miles S.E. of Tao-chou, Kan-su. Alt. 11,000′.

*Type.* Adult male. B.M. no. 11.11.1.3. Original number 184. Collected 10th April, 1911, by Dr. J. A. C. Smith. Presented by the Hon. N. Charles Rothschild.

This little vole shares with *M. irene* and *M. millicens* alone the combination of a *Pitymys*-like $m_3$ with a mammary formula of 2—2=8 and six hind foot-pads. From *M. millicens* it is distinguished by the absence of supplementary internal prisms on $m^2$, and from its nearest ally, *M. irene*, by its materially smaller size and shorter tail.

## LXXXI.—*Four new African Carnivores.*

By Oldfield Thomas.

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### *Helogale vetula*, sp. n.

A species nearly without the buffy and rufous tones characteristic of the other central and northern species.

General colour above finely grizzled grey, very much as in *H. atkinsoni*, but with still less suffusion of buffy. Head minutely speckled "smoke-grey"; no rufous or buffy on the sides of the face. Under surface scarcely lighter than back, the belly brownish grey, the throat and inguinal region drabby, washed inconspicuously with dull buffy. Sides of neck behind ears rather stronger buffy. Limbs like body to the metapodials, the latter and the digits dull pinkish buff. Tail grizzled, its tip and median line below slightly buffy.

Teeth of medium size.

Dimensions of the type (measured in flesh) :—

Head and body 215 mm.; tail (perhaps shortened in confinement) 130; hind foot 44; ear 25.

Skull: condylo-basal length 50·5; zygomatic breadth 32; interorbital breadth 10·4; breadth of brain-case 23·5; palatal length 24; breadth between outer corners of $p^4$ 19; $p^4$, length on outer edge 3·8, greatest diameter 5·1; breadth of $m^1$ 4·7.

*Hab.* Lamu, coast of British East Africa.

*Type.* Adult male. B.M. no. 11.10.26.1. Presented alive to the Zoological Society by the Rev. W. D. Braginton, and given at death to the National Museum.

This species is at once distinguished from the other East African forms of *Helogale* by the almost complete suppression of the buffy, rufous, or ochraceous tones generally present, especially on the muzzle, cheeks, and under surface. Even the comparatively greyish Somali species, *H. atkinsoni*, is tawny or ochraceous on the throat and inguinal region, though, like *H. vetula*, it has a greyish head.

From *H. hirtula* the present species is separated by its buffy instead of blackish toes.

### *Helogale percivali*, sp. n.

A dark grey species with blackish limbs.

Fur close, finely speckled, not loose and shaggy as in

*H. hirtula*, though the isolated longer hairs in the fur are unusually numerous. General colour above dark finely speckled greyish brown of a tone unlike that of any other species—a sort of greyish bistre; the underfur blackish for its basal half, dull ochraceous buff terminally. Head between burnt umber and vandyke-brown; chin and interramia similar. Belly darker brown; inguinal region paler. Forearms from elbows blackish brown, darkening on digits to black; fore claws rather larger than usual. Feet dark grizzled brown, the digits blackish brown. Tail dark speckled brown, not becoming more rufous terminally above, although there is an inconspicuous rufous line below, more obvious basally.

Dimensions of the type (measured in flesh):—

Head and body 225 mm.; tail 175; hind foot 47; ear 21.

Skull: condylo-basal length 505; zygomatic breadth 30; interorbital breadth 10; breadth of brain-case 22·5; front of canine to back of $m^2$ 17·4; $p^4$, length on outer edge 4·1, greatest diameter 6; $m^1$, breadth 4·8; $m^2$, breadth 4.

*Hab.* Orr Valley, near Mt. Nyiro, N. British E. Africa, 4500′.

*Type.* Adult male. Original number 427. Collected 31st March, 1911, by Mr. A. Blayney Percival.

This striking species is distinguishable by the combination of blackish feet with rufous head, the other rufous- or buffy-headed forms all having similarly rufous feet.

*Helogale hirtula lutescens*, subsp. n.

Like the typical *hirtula* of the highlands of Central Somali, but with the posterior back suffused with dull buffy. Throat and belly with the dull rufescent colour replaced by grey on the former and brownish on the latter part. In other respects as in *hirtula*, including the blackish digits.

$P^4$ of the type, greatest diameter 6·2; $m^1$ 5·6.

External measurements of the Webi specimen:—

Head and body 243 mm.; tail 185; hind foot 45; ear 15.

*Hab.* (of type). Lake Rudolf, on the plains near the N. end of the Lake. Another specimen from Italian Somaliland.

*Type.* Young male. B.M. no. 6. 11. 1. 19. Original number 126. Collected 7th August, 1905, by Ph. C. Zaphiro. Presented by W. N. McMillan, Esq.

The Museum owes to Dr. R. E. Drake-Brockman an adult example of this buffy-backed form of *H. hirtula*, obtained

by him at Afgo, Webi River, Italian Somaliland. But unfortunately its skull has been lost, and I therefore take as type Mr. Zaphiro's specimen from Lake Rudolf. Allowing for the difference of age, the two specimens appear to agree closely with each other, and equally to differ from the grey-backed *H. hirtula*.

*Lutra maculicollis nilotica*, subsp. n.

Larger than in the other subspecies, the throat white-spotted.

Size, as gauged by skull, larger than in true *maculicollis* and in *L. m. matschiei*. General colour as usual. Lips white-edged, throat profusely spotted with white, a few white spots also in the inguinal region.

Skull, both of male and female, decidedly larger than in the corresponding sexes of *maculicollis* and *matschiei*, the difference most pronounced in the male. Brain-case high and vaulted. Teeth comparatively large.

Skull-measurements of adult male and female specimens:—

Condylo-basal length 113·5 mm., 105; basal length 103·5, 96·8; zygomatic breadth 69, 63; interorbital breadth 20·5, 18·5; mastoid breadth 59, 54; height of brain-case from between bullæ 41, 40·5; front of canine to back of $m^1$ 34·5, 32·2; $p^4$, length on outer edge 12·4, 11·3; greatest diameter of $m^1$ 12·8, 10·6.

*Hab.* Malek, just south of Bor, Upper Nile.

*Type.* Adult male. Original number 2. Two skulls and three skins, obtained from the Dinkas by the Rev. Archibald Shaw, of the Church Missionary Society, by whom they were sent to Mr. A. L. Butler, of Khartoum.

While there is no question that this otter may be readily distinguished from the true *L. maculicollis* of South and Central Africa and *L. m. matschiei* of the Congo and Gulf of Guinea by its greater size, there is some doubt about the Abyssinian otter described by O. Neumann as *L. concolor* *. But Prof. Neumann expressly states that of many skins of *L. concolor* examined, none had any light throat-markings (these being present in all three of Mr. Butler's skins) and that the animal inhabited the Hawash river-basin on the eastern side of the watershed, and not the Nilotic river-system at all.

* SB. Ges. nat. Fr. Berl. 1902, p. 55.

## LXXXII.—*New Rodents from Sze-chwan collected by Capt. F. M. Bailey.* By Oldfield Thomas.

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The British Museum owes to the kindness of Capt. F. M. Bailey a number of small mammals obtained by him in Western Sze-chwan, during a recent shooting-trip to that rich and little-known country.

Besides examples of *Mustela sibirica*, *Sciurus castaneoventris*, *Dremomys pernyi*, and *Marmota robusta*, the collection contains examples of the following new forms.

### *Myospalax baileyi*, sp. n.

Allied to *M. cansus*, but tail shorter, feet hairy, and $m^3$ different.

Size about as in *M. cansus*. Colour grey, with scarcely any drabby tinge, the tone therefore markedly greyer than in the allied species. Under surface slaty, washed with very pale drab. Head darkened on crown, a small whitish nose-patch. Hands and feet white, closely hairy to the bases of the claws, the latter proportionally large. Tail unusually short, little longer than the hind foot, white throughout.

Skull essentially like that of *M. cansus*, with some slight differences. Nasals surpassing the premaxillæ posteriorly. Crown with the limiting lines of the masseteric fossæ approaching each other more closely posteriorly than at the fronto-parietal suture, the reverse being nearly always the case in *M. cansus*. Occiput with a median crest.

Teeth as in *M. cansus*, except that the postero-external lobe of $m^3$ is larger and has a fairly deep re-entrant angle between two projecting angles on its outer side, and a shallow re-entrant angle on its inner side; as a consequence, there are two re-entrant angles on the inner side of the tooth, and three on the outer, where also there are four salient angles. Below, the anterior lobe of $m_1$ is rather more developed, and there are three re-entrant angles on its inner side.

Dimensions of the type:—

Head and body 173 mm.; tail 33; hind foot 26.

Skull: greatest length 48; condylo-incisive length 39·6; zygomatic breadth 29; nasals 17·7; interorbital breadth 8·3; breadth on transverse crest 28·5; palatilar length 20·3; palatal foramina 6·6; upper molar series (crowns) 9·5; (alveoli) 9·8.

*Hab.* Rama Song, between Nag-chu-ka (=Ko-kou) and Ta-tsien-lu, W. Sze-chwan.

*Type.* Male. B.M. no. 11. 10. 3. 6. Original number 4. Collected 21st May, 1911, and presented by Capt. F. M. Bailey.

Tibetan name "Chu-lo."

This is the first example of the remarkable genus *Myospalax* to be found in Sze-chwan, and it is therefore probably very local in distribution. Its nearest geographical ally is *M. cansus* of Tao-chou, Kan-su, some 400 kilometres to the northward, and it is also most nearly allied to that animal zoologically, but may be distinguished by its hairy feet (that species having them nearly naked), its shorter tail, and its more complicated $m^3$.

*Ochotona roylei chinensis*, subsp. n.

Allied to true *roylei* and to "*nepalensis*," but greyer. Nasals longer.

General colour, in winter pelage, very similar to that of *O. roylei* and *nepalensis*, but clearer and paler grey, and entirely without the rufous tinge nearly invariably found on the head and flanks in that animal. Subterminal rings on the body-hairs almost white, without buffy suffusion. Tips of belly-hairs greyish white, not buffy or drab. Ears not especially large, metentote greyish with pale brown edge. Upper surface of hands and feet greyish white, with scarcely a trace of buffy tinge.

Of the summer pelage, two small patches are to be found on the specimen. One, behind the ear, is pale ochraceous, much paler than the warm ochraceous-rufous of the summer ear-patches of *O. roylei*. The other patch is on the flank, and again differs from the corresponding fur of *O. roylei* by its paler colour, as indicated by the whitish subterminal rings to the hairs.

Skull, on the whole, very like that of *O. roylei*, but the nasals are longer and narrower, and the bullæ are rather smaller. Two well-marked interorbital vacuities present in the type.

Dimensions of the type:—

Head and body 180; hind foot 32; ear 30.

Skull: greatest length 46·5; condylo-incisive length 44·3; greatest breadth 23; nasals 15·7 × 5·6; interorbital breadth 5·5; breadth of brain-case 18·3; palatal foramina 12·8; upper molar series (alveoli) 8·6.

*Hab.* Yara-tsa-ga, near Ta-tsien-lu, Sze-chwan. 13,000′.

*Type*. Adult male. B.M. no. 11. 10. 3. 7. Collected 16th May, 1911, and presented by Capt. F. M. Bailey.

This Pika is an eastern (Chinese) representative of *O. nepalensis*, the Nepal and Sikhim form, currently synonymized with *O. roylei*, but possibly itself subspecifically separable from that animal.

The only species previously known from this region was the much smaller *O. tibetana*, of which also Capt. Bailey obtained a specimen.

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## LXXXIII.—*The Osteology and Classification of the Gobioid Fishes.* By C. Tate Regan, M.A.

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The Gobioids are Teleostean fishes of the order Percomorphi; they differ from the Percoids in several features of specialization and form a well-marked suborder, which may be characterized as follows:—

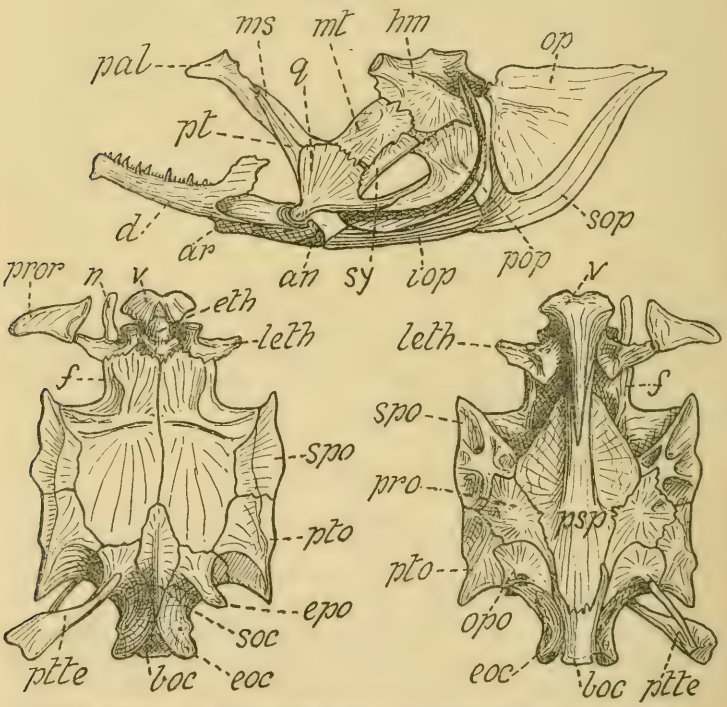
### Suborder Gobioidea.

Spinous dorsal, when present, of a few flexible spines; anal similar to soft dorsal, without or with but a feeble spine; pelvic fins thoracic or subjugular, each of a weak spine and 4 or 5 soft rays. Gill-membranes attached to isthmus. Skull depressed, more or less contracted between and expanded behind the orbits; parietals absent; epiotics separated by supraoccipital; exoccipital condyles wide apart; opisthotics large, reaching basioccipital and separating exoccipitals from pro-otics; no basisphenoid and no myodome. Nasals and præorbitals thin laminæ loosely attached to lateral ethmoids; suborbitals unossified. Hyomandibular very broad; a large foramen between symplectic, quadrate, and præoperculum; mesopterygoid slender or absent; palatine with a well-developed maxillary process supported by an apophysis of the lateral ethmoid; præmaxillaries protractile, with posterior pedicels; lower pharyngeals separate. Post-temporal forked; post-cleithrum single; pectoral radials 4, large, laminar, united to form a plate. Vertebræ 25 to 34; first centrum with a pair of lateral apophyses which articulate with the exoccipital condyles; ribs on well-developed transverse parapophyses; epipleurals on ribs.

### Family 1. Eleotridæ.

Pelvic fins separate. Palatine with an ascending stem articulating directly with a lateral ethmoid apophysis behind the origin of the maxillary process; mesopterygoid narrow,

Fig. 1.




*Eleotris marmorata.* Lower jaw, hyo-palatine and opercular bones, and skull seen from above and from below.

*d*, dentary; *ar*, articulare; *an*, angulare; *pal*, palatine; *pt*, pterygoid; *ms*, mesopterygoid; *mt*, metapterygoid; *q*, quadrate; *hm*, hyo-mandibular; *sy*, symplectic; *pop*, præoperculum; *op*, operculum; *sop*, suboperculum; *iop*, interoperculum; *pror*, præorbital; *n*, nasal; *v*, vomer; *eth*, mesethmoid; *leth*, lateral ethmoid; *f*, frontal; *spo*, sphenotic; *pro*, pro-otic; *pto*, pterotic; *opo*, opisthotic; *epo*, epiotic; *psp*, parasphenoid; *boc*, basioccipital; *eoc*, exoccipital; *soc*, supra-occipital; *ptte*, post-temporal.

but well developed. Hypercoracoid and hypocoracoid well developed; radials inserted on hypercoracoid, hypocoracoid, and on the ligamentous or cartilaginous tissue between these bones. Vertebræ 25 to 28 (10–12 + 14–17).

Genera: *Oxymepoton. Ioglossus, Philypnus, Dormitator, Eleotris, Odontobutis, Asterropteryx, Rhiachichthys*, &c., &c.

According to Starks ('Science,' xxxiii. 1911, p. 2) the condition of the shoulder-girdle in the Gobioids, as exemplified by *Dormitator maculatus*, is as follows :—"The coracoid elements and the actinosts are arranged in a continuous row on the posterior edge of the clavicle; the hypercoracoid above, next the actinosts, and ending below with the hypocoracoid—the actinosts attached directly with the clavicle, and separating the coracoid elements widely from each other." I have examined *Dormitator maculatus*, and find that the pectoral arch closely resembles that of *Eleotris marmorata* (fig. 2, A), differing only in that the coracoid elements are more widely separated, so that the whole of the third radial and a small part of the second and fourth articulate with the ligamentous tissue separating the hypercoracoid from the hypocoracoid.

Stark's description applies to Gegenbaur's figure of *Gobius guttatus*, but not to any actual Gobioid fish, and I am unable to accept his suggestion that the Gobioids may be an offshoot of the Scorpænoids; the resemblance of the pectoral arch of the Gobioids to that of the Cottidæ is not very close, for the relation of the first radial to the hypercoracoid is quite different in the two groups; from this it results that in the Cottidæ the hypercoracoid persists above the first radial, whereas in the Gobiidæ it is suppressed.

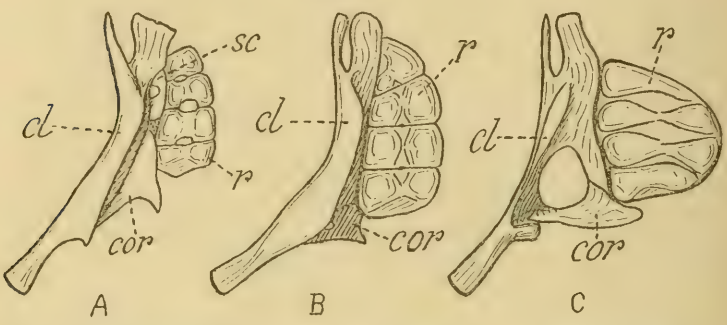
## Family 2. Gobiidæ.

Pelvic fins, when well developed, united, usually forming an adhesive cup or disc. Palatine T-shaped, with a posterior process for articulation with the lateral ethmoid; mesopterygoid vestigial or absent. Hypercoracoid absent; radials inserted on the cleithrum, only the lowest in contact with the hypocoracoid (fig. 2, B, C).

The Gobiidæ closely resemble the Eleotridæ in their osteology except for the characters of specialization enumerated above, although the interorbital region is usually narrower and may even be compressed to a vertical lamina (*Periophthalmus*) with obliteration of the interfrontal suture. Emery has given some figures of the head-skeleton of *Gobius capito* (Faun. u. Flor. d. Golf. v. Neapel, ii. 1880, pl. iii. figs. 28, 29, 33). These are incorrect in some particulars; in fig. 28 the epiotics are shown as divided into parietals and epiotics, whilst in fig. 33 the mesopterygoid, which is a small splint on the upper edge of the pterygoid, is not shown,

the metapterygoid is identified as mesopterygoid, the symplectic as metapterygoid, and part of the præoperculum as symplectic.

Fig. 2.




Pectoral fin-skeleton of:—A. *Eleotris marmorata*; B. *Gobius capito*; and C. *Periophthalmus kœlreuteri*.

*cl*, cleithrum; *sc*, hypercoracoid; *cor*, hypocoracoid; *r*, radials.

## Subfamily 1. *Gobiinæ*.

Eyes not erectile; base of pectoral fin normal. Pectoral radials moderately elongate, inserted on a very narrow ridge of the cleithrum; hypocoracoid small, the foramen between it and cleithrum minute or absent.

The genera may be arranged thus:—

I. Spinous dorsal, when present, separate; soft dorsal free from caudal; pectorals large; vertebræ 25 to 28 (10–12+15–17).
*Gobius, Latrunculus, Gobiodon, Hoplopomus, Cryptocentrus, Chasmias, Tridentiger, Crystallogobius, Luciogobius, Leucosparion, Sicydium*, &c., &c.

II. Vertical fins confluent; pectorals small or moderate.

A. Vertebræ 28 or 29 (11+17–18); caudal vertebræ elongate ..... *Gobioides, Tænioides.*
B. Vertebræ 34 (10+24); caudal vertebræ normal..... *Trypauchen, Trypauchenichthys.*

In *Trypauchenichthys* the pelvic fins are small, separate, each of a spine and four soft rays, the two inner vestigial; in the other Gobiinæ each pelvic fin has five soft rays and they are united to form a disc.

Subfamily 2. *Periophthalminæ.*

Eyes close together, prominent, erectile ; base of pectoral fin very muscular. Pectoral radials elongate, inserted on a broad laminar ridge of the cleithrum ; hypocoracoid and cleithrum enclosing a large foramen. Vertebræ 25 or 26 (10–11+14–16).

*Periophthalmus*, *Boleophthalmus*.

Family 3. **Psammichthyidæ.**

The little fish from the Seychelles which I named *Psammichthys nudus* * and placed in the family Trichonotidæ agrees better with the Gobioids in fin-structure and in the number of vertebræ, and may provisionally be referred to this suborder. The body is elongate, naked; the eyes are very small and close together; the mouth is oblique, with the lower jaw prominent, pointed, and with narrow bands of teeth in the jaws; the gill-openings are wide, but the gill-membranes are narrowly joined to the isthmus. The vertebræ, judging by the myotomes, number 24 or 25. The dorsal fin is single, of 19 rays, the first five spinous, the last spine rather distant from the fourth and from the first soft ray ; the anal has 14 rays, the first a feeble spine, the caudal 11 principal rays (9 branched), the pectoral 8 rays. The pelvic fins are separate, close together, a little in advance of the pectorals, each of a spine and 5 soft rays.

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LXXXIV.—*On a new West-African Squirrel presented to the British Museum by Mr. P. A. Talbot.* By Guy Dollman.

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*Funisciurus auriculatus oliviæ*, subsp. n.

Allied to *Funisciurus auriculatus boydi*, Thos.

Size and proportions about as in *boydi*. General colour of dorsal surface very different from that of the allied forms; nape of neck and shoulders pale yellowish olive, without the conspicuous dark black tint present in *auriculatus* and *boydi*. Posterior back and rump bright yellowish buff, washed with

* Trans. Linn. Soc. 2nd ser. Zool. xii. 1908, p. 246, pl. xxxi. fig. 1.

light brown, the general effect markedly different from the reddish colour of *boydi* and true *auriculatus*. Flanks much the same colour as back, paler and more generally speckled with yellowish olive, especially near the ventral surface. Light lateral stripes rather clearer than in the Cameroon species, posterior portions broken up into distinct light yellowish spots. Limbs similar in colour to shoulders, the hind limbs fairly sharply marked off from the buff tint of the rump and posterior back. Face, forehead, and back of head bright orange-rufous (dead leaf no. 3, 'Répertoire de Couleurs'), without the conspicuous black speckling present in *boydi*, the entire head appearing rufous. Dark patches behind ears fairly well defined. Backs of hands and feet dull brownish red, rather similar in colour to those of true *auriculatus*, much less rufous than in *boydi*. Ventral surface of body pale buff, a great deal paler than in the allied forms. Tail as in *auriculatus*.

The skull of the type is unfortunately missing, as is also the skull of the only other specimen of this new form, but the general characters of the skin leave no room for doubt as regards its affinities with the *auriculatus* group.

Dimensions of the type (measured in the flesh) :—

Head and body 184 mm. ; tail 154; hind foot 45 ; ear 18.

*Hab.* Oban District, Southern Nigeria. Altitude 500 feet.

*Type.* Adult male. B.M. no. 11. 11. 16. 1. Original number 42. Collected by Mr. P. A. Talbot on September 23rd, 1911, and presented by him to the British Museum.

This handsome squirrel is readily distinguished from the allied forms by the bright yellowish coloration of the hind-quarters and posterior back, the yellowish-olive neck, shoulders and limbs, the almost pure rufous-orange colour of the head, without any conspicuous black speckling, and by the pale buff tint of the entire ventral surface. *Funisciurus auriculatus*, *a. boydi*, and *a. beatus* are all much more rufous on the back, a great deal darker on the neck and shoulders, richer in colour on the ventral surface, and with the posterior portion of the head speckled with black or yellow and black.

Mr. Talbot obtained two specimens of this beautiful new squirrel, both collected near Oban at the conclusion of the journey across Nigeria which he recently made in company with Miss Olive MacLeod, and it is in honour of Miss MacLeod that this new form is named.

## LXXXV.—*Descriptions of new Genera and Species of Oriental Homoptera.* By W. L. Distant.

### Fam. Fulgoridæ.

### Subfam. *Cixiinæ.*

*Oliarus indica*, sp. n.

Head black, the margins of the vertex ochraceous; pronotum and mesonotum black, the margins of the first and the central carinations and lateral margins of the latter ochraceous; abdomen above black, the segmental margins more or less ochraceous; face black, its central carination and lateral margins ochraceous; body beneath and legs ochraceous or brownish ochraceous; tegmina creamy white, subhyaline, with bronzy-brown suffusions, these consist of a narrow basal fascia, a broader and more irregular fascia before middle, but neither reaching costal nor inner areas, and an oblique fascia extending from middle of apical margin, where it is broadest, and terminating a little beyond claval apex, the veins and stigma are also fuscous brown; wings subhyaline, the veins fuscous brown; vertex longer than broad, the lateral margins strongly elevated; pronotal margins moderately prominent; mesonotum with longitudinal ridges; face obtusely angulated near middle.

Long., excl. tegm., 5 mm.; exp. tegm. 19 mm.

*Hab.* "India" (Brit. Mus.).

Allied to *O. caudatus*, Walk., but differing in the more angulated margins of the face, suffusions to tegmina, different coloration, &c.

*Oliarus greeni*, sp. n.

Vertex, pronotum, and mesonotum black; margins of vertex and pronotum ochraceous, the longitudinal ridges to mesonotum concolorous or faintly testaceous; abdomen above black, ochraceous at base; face and clypeus mostly black, their margins and central ridge ochraceous; sternum and legs more or less ochraceous, the latter streaked with piceous; abdomen beneath black, the base, segmental margins, and anal appendages ochraceous; tegmina and wings hyaline with black markings, of which there are three spots in transverse series about one-third from base, all the transverse veins beyond middle, the stigma, an apical spot beyond it, about five smaller subapical spots, and minute

spots at the apices of the longitudinal veins to apical areas; wings with the veins darker but unspotted; vertex longer than broad, the margins strongly ridged, face longer than breadth before clypeus, gradually and somewhat convexly widened to base of clypeus, the margins and central ridge strongly developed; mesonotum with five longitudinal ridges; tegmina about twice as long as broad.

Long., excl. tegm., 4–5 mm.; exp. tegm. 11–15 mm.

*Hab.* Ceylon; Kandy, Eppawela (*Green*, Brit. Mus.).

To be placed near *O. stigma*, Motsch.

*Oliarus annandalei*, sp. n.

Head ochraceous, the vertex between the marginal ridges black; pronotum ochraceous, with a transverse piceous foveate line on each side; mesonotum shining black, the longitudinal ridges concolorous; abdomen above black, the posterior segmental margins ochraceous; face black, the marginal and central ridges ochraceous; sternum black; abdomen beneath and legs ochraceous, femora more or less streaked with piceous; tegmina hyaline, a broad bronzy-brown fascia near base and a little more than apical third fuscous brown; wings hyaline, the veins a little darker; vertex longer than broad, the marginal ridges strongly developed; pronotum very short, especially at middle, marginal ridges strongly developed; mesonotum with five discal longitudinal ridges; posterior tibiæ with a distinct submedial spine; tegmina about three times longer than broad, the stigma elongately triangular, ochraceous, its inner margin black.

Long., excl. tegm., 4½ mm.; exp. tegm. 12 mm.

*Hab.* Lower Bengal; Port Canning (*Annandale*, Ind. Mus.).

*Oliarus hodgarti*, sp. n.

Allied to the preceding species, *O. annandalei*, but with the vertex shorter and broader; tegmina shorter and comparatively broader, less than three times longer than broad and without a broad basal bronzy fascia; face a little narrower and the lateral margins less convexly rounded.

Long., excl. tegm., 4 mm.; exp. tegm. 9½–10 mm.

*Hab.* Bengal; Goalbathan (*R. Hodgart*). Bandel, Hooghly District (*C. Paiva*). Chapra (*Mackenzie*, Brit. Mus.). Sara Ghat, River Ganges (*J. T. Jenkins*). Kurseong (E. Himalayas).

In some specimens the fuscous apical area to the tegmina is almost obliterated, but the veins there are then distinctly infuscated.

*Oliarus simlæ*, sp. n.

Body above black, margins of vertex and pronotum, lateral margins and central-longitudinal ridges to mesonotum, and posterior segmental margins to abdomen ochraceous; face black, about posterior half, the lateral margins, and the central carination ochraceous; body beneath and legs black or piceous; rostrum (excluding apex), base of abdomen, posterior segmental margins, tibiæ, tarsi, and apices of femora more or less ochraceous; tegmina and wings hyaline, the former with more than half of the venation dull ochraceous, somewhat thickly covered with longly setose granules, veins of the apical area mostly black, stigma elongate, black; vertex elongate, distinctly longer than broad, its lateral margins strongly elevated; mesonotum with five central ridges; face nearly twice as long as broad, the central and lateral ridges acute; tegmina about three times as long as broad.

Long., excl. tegm., 5½ mm.; exp. tegm. 14 mm.

*Hab.* Simla (Brit. Mus.).

Allied to *O. caudatus*, Walk., but differing principally by the narrower and longer face and vertex.

*Oliarus kurseongensis*, sp. n.

Closely allied in general appearance to the preceding species, *O. simlæ*, but differing in the broader vertex (in that respect more like *O. caudatus*, Walk.), the narrower and black face, the central ridge and lateral margins of which are alone testaceous, and in the two discal transverse veins of the tegmina situate almost in a line with the commencement of the stigma, being both almost perpendicular and in a line with one another, not angulated as in *O. simlæ*, and more especially by a perfectly straight and continuous transverse vein on the disk of the apical area a little before the bases of the apical cells.

Long., excl. tegm., 4½ mm.; exp. tegm. 12–12½ mm.

*Hab.* E. Himalayas; Kurseong (Ind. Mus.).

*Oliarus nuwaræ*, sp. n.

Resembling the two previous species, *O. simlæ* and *O. kurseongensis*, in general appearance, but differing in the following structural characters:—Vertex longer than broad,

thus resembling *O. simlæ*; face (excluding central and lateral marginal ridges) wholly black, thus resembling *O. kurseongensis*: the most salient differences in the three species are found in the venation of the tegmina; in *O. nuwaræ* there are three discal transverse veins a little beyond middle, in *O. simlæ* two, the lowermost faint, in *O. kurseongensis* there are two, and in addition a perfectly straight and continuous transverse vein on the disk of the apical area.

Long., excl. tegm., 4 mm.; exp. tegm. 12 mm.

*Hab.* Ceylon; Nuwara Eliya, Peradeniya (*Green*, Brit. Mus.).

*Oliarus binghami*, sp. n.

Body above castaneous; margins of vertex and pronotum, posterior margins of mesonotum, and posterior abdominal segmental margins ochraceous; head beneath (including face), sternum, and legs pale castaneous or brownish ochraceous; abdomen beneath of the colour and markings of the upper surface; tegmina greyish white, subopaque, the venation brownish, and with the following fuscous-brown markings—three narrow spots in costal membrane, three somewhat long curved linear spots beneath costal membrane and a little beyond base, and some larger maculate markings on apical area, consisting of a spot at end of stigma, a transverse fascia before apex, apical margin and a large internal fasciate spot beneath stigma, which is bifurcate towards inner margin and there enclosing a pale spot; wings very pale fuliginous with the veins darker; vertex foveate with a central carination, the margins strongly ridged; margins of pronotum strongly ridged; mesonotum with five central carinations; face centrally and medially strongly ridged.

Long., excl. tegm., 6 mm.; exp. tegm. 18 mm.

*Hab.* Rangoon (*Bingham*, Brit. Mus.).

Allied to *O. stigma*, Motsch.

*Mnemosyne cingalensis*, sp. n.

Head, pronotum, and mesonotum piceous, the carinate margins of vertex and the carinations to mesonotum testaceous, the margins of pronotum ochraceous; abdomen above brownish ochraceous, the segmental margins paler; body beneath pitchy brown, the legs brownish ochraceous; tegmina milky white, subopaque, and with fuscous-brown spots and markings, these consist principally of three double sets

of small spots in costal membrane, the stigma, and a broad irregular longitudinal suffusion from base to apex, the venation also fuscous brown; wings very pale fuliginous, the veins darker; vertex longer than broad, the margins strongly carinate; margins to pronotum carinate; mesonotum with five central longitudinal carinations; face centrally and marginally strongly carinate, the central carination bifurcate at apex; clypeus centrally and marginally carinate; female with a long central abdominal apical appendage; posterior tibiæ with a distinct spine near middle.

Long., excl. tegm., 6½ mm.; exp. tegm. 18 mm.

*Hab.* Ceylon; Trincomalee (*Green*, Brit. Mus.).

ADZAPALA, gen. nov.

Head moderately large and prominent, eyes large, longer than broad, vertex longer than broad, distinctly concave, the lateral margins carinate; face large, posteriorly about as broad as long, centrally longitudinally carinate, the carination anteriorly bifurcate, the anterior margin about half the breadth of the posterior margin, a distinct transverse incision level with the posterior margins of the eyes, before clypeus distinctly concave, an ocellus on each side near posterior margin; clypeus large and broad, almost as long as face, centrally carinate; pronotum very short, strongly straightly angulate; mesonotum large, considerably longer than head and pronotum together, with five central carinations; abdomen broad and robust; posterior tibiæ strongly spined near middle; tegmina more than twice as long as broad, distinctly angulately sinuate beyond clavus, claval vein not extending much beyond the middle of clavus, stigma large, inwardly convexly rounded, two waved series of transverse veins, one beyond middle, the other nearer apex, thus defining respectively apical and anteapical cells, apical margin rounded; wings shorter and at base about as broad as tegmina, two oblique discal transverse veins beyond middle.

This genus by the five carinations to the tegmina is allied to both *Oliarus* and *Mnemosyne*, from both of which it differs by the structure of the face and the sinuate tegmina beyond the apex of clavus.

*Adzapala greeni*, sp. n.

Vertex dull ochraceous, eyes piceous; pro- and mesonota piceous, the carinations to the latter testaceous; abdomen above fuscous brown, the lateral areas ochraceous; face

greenish ochraceous, a broad transverse piceous fascia between the eyes, and the clypeus also of the latter colour; body beneath almost entirely piceous, the legs ochraceous, femora (excluding apices) piceous; tegmina hyaline, the veins brownish with minute setose piceous spots, the transverse veins prominently fuscous brown, costal margin with transverse piceous spots, basal area and the area of the inner transverse veins more or less bronzy brown; wings slightly pale fuliginous, the veins darker.

Long., excl. tegm., 4½ mm.; exp. tegm. 11½ mm.

*Hab.* Ceylon; Trincomalee (*Green*, Brit. Mus.).

ADOLENDA, gen. nov.

Vertex somewhat triangular, the margins strongly ridged, the angles of the face visible from above; face long and slender, narrowest between eyes and distinctly projecting above them, the margins strongly ridged, a distinct ocellus before clypeus, which is short and strongly, centrally, and laterally ridged; pronotum very short, the lateral areas a little ampliate, the posterior margin strongly angularly emarginate; mesonotum a little longer than head and pronotum together, tricarinate, the lateral carinations oblique; abdomen moderately broad and robust; legs slender, posterior tibiæ unarmed; tegmina three times as long as broad, costal membrane broad and unveined, at its apex a cell enclosing stigma, beneath this three distinct subapical cells, beyond these a central longitudinal cell reaching apex, on each side of which are connected oblique cells, claval vein not reaching apex of clavus; wings broader and shorter than tegmina, two transverse veins on disk and two apical triangular cells.

Allied to the Neotropical genus *Œcleus*, Stål.

*Adolenda typica*, sp. n.

Vertex, pronotum, and mesonotum brownish ochraceous, margins of vertex and pronotum, and margins and carinations to mesonotum, dull ochraceous; abdomen above piceous, narrowly ochraceous at base; head, sternum, and legs ochraceous; abdomen beneath piceous; tegmina hyaline, the veins piceous and with the following fuscous-brown spots: a stigmatal spot, two below costal membrane, the outermost connected with a short curved fascia which extends submarginally round posterior half of vertex, and three spots on inner margin, the basal one largest; wings hyaline, the veins darker.

Long., excl. tegm., 4 mm.; exp. tegm. 11 mm.

*Hab.* Simla (Brit. Mus.).

*Anila versicolor*, sp. n.

Vertex, pronotum, and mesonotum black; lateral margins of vertex, margins of pronotum, and posterior margins of metanotum pitchy brown; abdomen above ochraceous, transverse basal and apical fasciæ black; face and sternum black; abdomen beneath and legs ochraceous; tegmina hyaline with fuscous and ochraceous shadings, the first consisting of a basal fascia, stigma and a subapical transverse fascia, darkest anteriorly and posteriorly, the ochraceous shadings consist of a broad transverse fascia before middle and a more broken fascia beyond middle; wings hyaline, the venation and apex distinctly infuscate; vertex as long as broad, the lateral margins raised and laminate; face longer than broad, truncate anteriorly (where it is narrowest) and concavely emarginate posteriorly (where it is broadest); clypeus moderately convex, centrally and laterally carinate; posterior tibiæ with two spines; tegmina veined as in generic diagnosis.

Long., excl. tegm., 4 mm.; exp. tegm. 13 mm.

*Hab.* Lebong, 4500 feet (*F. M. Howlett*, Brit. Mus.).

COMMOLENDA, gen. nov.

Vertex a little broader than long, centrally and laterally carinate, not extending beyond eyes, the frontal angles of the face visible above; face as long as greatest breadth, widened towards clypeus, anterior margin truncate, posterior margin somewhat strongly emarginate, centrally carinate, the margins ampliately reflexed and ridged, an ocellus on each side of posterior margin; clypeus shorter than face, centrally and laterally ridged; pronotum exceedingly short, strongly waved and ridged; mesonotum longer, but not twice as long as pronotum and vertex together, tricarinate; abdomen moderately robust; tegmina less than twice as long as greatest breadth, costal margin distinctly waved, moderately but distinctly broadened towards apices which are rounded, claval vein not reaching apex; wings a little shorter and broader than tegmina; posterior tibiæ unarmed.

Allied to the genus *Kirbyana* from Ceylon.

*Commolenda deusta*, sp. n.

Vertex, pronotum, mesonotum, face, and sternum fuscous brown; legs ochraceous; abdomen black, the apical area and narrow segmental margins ochraceous; wings hyaline, the veins thickly covered with small dark granules, basal half

with numerous small fuscous spots, of which the largest one is above the clavus, on apical half several waved fuscous lines, the apices of the apical veins also fuscous; wings hyaline, the veins darker.

Long., excl. tegm., 3 mm.; exp. tegm. 11 mm.

*Hab.* Central India (Brit. Mus.).

A single specimen thus labelled is my only knowledge of this species.

PARAMICRIXIA, gen. nov.

Head much shorter than the anterior margin of the pronotum, vertex short and narrow, a little widened anteriorly, the apices of the lateral margins prominent; face moderately long and narrow, gradually widening to clypeus, the lateral margins strongly ridged; clypeus shorter than face, centrally ridged; pronotum short but broad, centrally ridged, the lateral angles distinctly spined; mesonotum about as long as pronotum and vertex together, tricarinate, the central carination straight, the sublateral ones more or less curved; abdomen short and broad; legs somewhat slender, posterior tibiæ not spined; tegmina and wings hyaline; tegmina only slightly more than twice as long as broad, the apex subconically rounded, costal membrane large and distinct, at its apex and beneath stigma is a somewhat rounded cell, its inner margin connected by sinuate transverse veins to the posterior margin near claval apex, three apical cells beyond stigma and two cells caused by vein-bifurcation on apical margin; wings about as broad as but shorter than tegmina, two apical cells caused by vein-bifurcation.

This peculiar genus finds its ally in the Mexican *Micrixia*, Fowl.

*Paramicrixia diaphana*, sp. n.

Body above bronzy black; lateral margins of vertex testaceous; body beneath black; apex of clypeus, rostrum, basal area of abdomen, and the femora more or less ochraceous, tibiæ piceous; lateral margins of face testaceous, a little greyish before clypeus; tegmina and wings hyaline and unmarked, save by the dark venation and the very narrow piceous margins, the margin at the stigmatal area is slightly more pronounced.

Long., excl. tegm., 3 mm.; exp. tegm. 9 mm.

*Hab.* Bengal (Brit. Mus.).

The British Museum possesses a single specimen of this interesting species.

*Mundopa vagans*, sp. n.

Vertex, pronotum, and mesonotum black, abdomen above pale piceous with the segmental margins paler; face black, the lateral margins paler; clypeus black; sternum and abdomen beneath ochraceous with piceous suffusions; legs ochraceous, femora more or less suffused with piceous; tegmina fuscous brown, the veins darker, the stigma piceous with its basal margin greyish white, before the apical area a series of about four discal elongate, very obscure greyish-white spots; wings fuscous brown, the veins darker; vertex with the lateral margins ampliately and apically subacute; face longer than broad, the lateral margins lamminately raised and with a distinct basal ocellus.

Long., excl. tegm., 2½ mm.; exp. tegm. 8 mm.

*Hab.* Ceylon; Galle (*Bainbrigge Fletcher*, Brit. Mus.). Calcutta (*Annandale*, Ind. Mus.).

*Mundopa regina*, sp. n.

Head and thorax black; head somewhat greyishly tomentose; vertex and pronotum with the lateral and basal margins testaceous; abdomen above dark testaceous; face black, more or less greyishly tomentose, the anterior and lateral margins testaceous; body beneath piceous, the legs fuscous; tegmina pale piceous, the veins black, the basal area obliquely cinnamomeous, the costal membrane piceous, the costal and apical margins greyishly tomentose, a short discal linear streak before the apical area greyish brown; wings pale piceous, the veins black; lateral margins of the vertex ampliately raised and apically subacute; face elongate, the margins almost parallel, not posteriorly ampliate, with a central longitudinal ridge and the lateral margins strongly ampliately carinate, a distinct ocellus at its posterior margin; tegmina about twice as long as broad, costal margin distinctly, slightly beyond middle, shortly concavely sinuate.

Long., excl. tegm., 3 mm.; exp. tegm. 11 mm.

*Hab.* Travancore (Brit. Mus.).

*Mundopa balteata*, sp. n.

Vertex, pronotum, and mesonotum black; margins of vertex and pronotum testaceous; abdomen above pitchy brown; face, clypeus, and body beneath pitchy black; legs pale ochraceous; tegmina bronzy brown, crossed near middle by a transverse greyish-white fascia, before this fascia and beneath the costal membrane the colour is considerably paler

than on the apical area; margins of vertex ampliately raised and apically subacute; face long and somewhat narrow, strongly centrally ridged, lateral margins strongly ampliately carinate; mesonotum tricarinate.

Long., excl. tegm., 3 mm.; exp. tegm. 8 mm.

*Hab.* Ceylon; Nalanda (*Green*, Brit. Mus.).

*Borysthenes strigipennis*, sp. n.

Head, pronotum, mesonotum, body beneath, legs, and base of abdomen above ochraceous, more or less thickly greyishly tomentose, apical half of abdomen above a little darker; tegmina very pale ochraceous, the veins darker, and between many of the veins the colour is much darker ochraceous; wings pale fuliginous, the veins darker; vertex with a transverse impression between the eyes, the disk foveate and the lateral margins strongly carinate, its apex, seen from above, having the appearance of acute apical angles; mesonotum with three longitudinal ridges.

Long., excl. tegm., 3 mm.; exp. tegm. 10–11 mm.

*Hab.* E. Himalayas; Kurseong (*Lynch*, Ind. Mus.).

Allied to *B. diversa*, Dist., from which it differs by the lesser and differently arranged macular markings of the tegmina, the more concave face, and less developed central ridge to same, &c.

*Borysthenes suknanicus*, sp. n.

Body above fuscous brown, more or less greyishly tomentose, the head, pronotum, and mesonotum almost entirely suffused; the abdominal segmental margins distinctly paler; head beneath, sternum, and legs ochraceous; abdomen beneath piceous, somewhat greyishly tomentose; tegmina creamy white, with fuscous-brown markings, of which there are two elongate spots in costal membrane, two smaller streaks beneath them (one linear, the other curved) beyond middle more completely fuscous brown, enclosing the following creamy-white markings: two elongate spots, an outer rounded, a more quadrate costal spot, and a curved subapical fascia; wings creamy white, the veins fuscous brown, with suffusions of the same colour at apex, disk, and costal margin, the posterior marginal area is also faintly suffused with pale fuscous; anterior angles of vertex prominent and robust, vertex transversely carinate between the eyes; mesonotal carinations obscured by very thick tomentosity; tegmina very broad, their maximum breadth greater than that of wings; face centrally longitudinally

ridged, its lateral margins concavely sinuate, slightly convexly rounded before clypeus.

Long., excl. tegm., 3½ mm.; exp. tegm. 10½ mm.

*Hab.* E. Himalayas; Sukna, 500 feet (*Annandale*).

*Brixia plagosa*, sp. n.

Vertex, pronotum, mesonotum, and abdomen above piceous; face, body beneath, and legs brownish ochraceous; tegmina pale bright ochraceous, the veins a little darker, stigma greyish brown, three transverse series of somewhat indistinct silvery spots more or less margined with castaneous, the first short and strongly oblique near base, the second longest and slightly oblique near middle, the third short and discal before apical area which is somewhat pale brownish, and is inwardly marked by an obscure, rounded, narrow, greyish fascia, margins of tegmina narrowly pale castaneous, and with the following castaneous spots: three on costal margin before stigma, the third longest, a larger spot beyond stigma, a large spot on inner margin a little beyond claval apex and a smaller one at apex of claval vein, a short transverse discal paler spot before apical margin; wings very pale fuliginous; face narrowing to apex, but not prominently compressed between the eyes, the lateral margins strongly carinate, and with a distinct medial ridge and basal ocellus; tegmina about twice as long as broad.

Long., excl. tegm., 4½ mm.; exp. tegm. 14 mm.

*Hab.* E. Himalayas; Kurseong, Sukna (*Annandale*).

*Brixia inornata*, sp. n.

Head, pronotum, and mesonotum dark castaneous; abdomen castaneous, strongly greyishly tomentose; face, sternum, and legs pale brownish ochraceous; abdomen beneath castaneous; tegmina pale greyish brown, the veins strongly fuscous brown, the stigma ochraceous, immaculate excepting some very small and obscure pale spots on the apical margin; wings obscure greyish, the veins darker; face long and narrow, strongly narrowed between the eyes, the lateral margins very strongly carinate; mesonotum tricarinate; tegmina more than twice as long as broad.

Long., excl. tegm., 5 mm.; exp. tegm. 16½–17 mm.

*Hab.* N.E. Himalayas; Kurseong (*Annandale*).

This species is to be recognized by the strongly darkly veined, but non-maculate or fasciate tegmina. Dr. Annandale captured two specimens of this distinct species.

*Brixia elongata*, sp. n.

Body above black or piceous; face black, the lateral margins brownish ochraceous; sternum and legs brownish ochraceous; abdomen beneath black, anal appendages brownish ochraceous; tegmina pale brownish ochraceous, the veins darker and minutely setosely maculate, considerably suffused with fuscous-brown markings, of which the principal ones are: a broad transverse basal fascia followed by an elongate spot on costal membrane, a broad transverse fascia before middle which encloses a small pale spot on costal membrane, the stigma and more or less the whole apical area, on which there are some obscure greyish spots, the apices of the apical veins are also shortly greyish, a greyish marginal spot a little beyond claval apex; wings pale fuliginous, the veins darker; tegmina long and narrow, nearly three times as long as broad; face long and narrow, compressed between the eyes.

Long., excl. tegm., 4 mm.; exp. tegm. 14–15 mm.

*Hab.* Ceylon; Horton Plains, Pattipola (*Green*, Brit. Mus.).

The salient and most distinctive character of this species is found in the long and narrow tegmina.

*Brixia variolosa*, sp. n.

Body piceous; lateral margins of mesonotum brownish ochraceous; posterior abdominal segmental margins greyish white; sternum and legs brownish ochraceous; tegmina fuscous brown, with numerous pale markings either ochraceous or greyish white, of which the principal ones are a transverse fascia a little beyond base, two contiguous transverse irregular fasciæ near middle, the innermost darker and more ochraceous, basal and inner margins of stigma, beneath which are seven pale spots followed by a more ochraceous spot near claval apex, on apical area three clusters of pale spots; wings fuliginous, the veins darker; face long, much narrowed between the eyes, the lateral margins strongly carinate or ridged; tegmina a little more than twice as long as greatest breadth, the costal margin distinctly sinuate; mesonotum tricarinate.

Long., excl. tegm., 5 mm.; exp. tegm. 15 mm.

*Hab.* E. Himalayas; Kurseong (*Annandale*).

The sinuation of the costal margin of tegmina, near base, is a distinctive character of this species.

*Brixia geometrina*, sp. n.

Body above dark castaneous brown; apical angles of

vertex, margins and carinations to pro- and mesonota, lateral margins of abdomen above, body beneath, and legs ochraceous; tegmina semi-opaque, greyish white, margins very narrowly, and the stigma ochraceous, an oblique basal fascia, a transverse spot in costal area, an irregular spot in clavus, a broad transverse fascia before middle, irregular subapical suffusions, a central transverse spot near apex and the apical margin fuscous, the broad transverse fascia contains two small pale spots, and the apices of the apical veins are distinctly ochraceous; wings pale subhyaline with the venation fuscous; tegmina with the costal margin near base slightly sinuate; face elongate, much narrowed between the eyes.

Long., excl. tegm., 5 mm.; exp. tegm. 17 mm.

*Hab.* Ceylon; Pattipola (*Green*, Brit. Mus.).

Allied to the previous species, *B. variolosa*, by the less sinuate costal margin near base.

[It may be well to state that I have transferred my entire entomological collections to the British Museum, and that the whole of my types—excluding those located elsewhere—are now contained in that institution.]

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## LXXXVI.—*Notes on the Family* Masaridæ (*Hymenoptera*), *with Descriptions of a new Genus and Three new Species.*

By Geoffrey Meade-Waldo, M.A.

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The recent acquisition of three new species of these rare wasps is a matter for congratulation. Of the twenty-one species hitherto described in this genus the British Museum possesses nineteen, in each instance the type specimens. The remaining two species are in the Paris Museum.

The rarity of these insects is shown by the fact that such diligent collectors as Mr. R. E. Turner and his brother, the late Gilbert Turner, could only collect one specimen during a twenty years' residence in North Queensland, while Dr. Perkins, to whom the Museum is indebted for the species described below, has only received three specimens from Mr. F. P. Dodd at long intervals.

The three specimens received from Dr. Perkins are referable to three different species.

In presenting the specimens Dr. Perkins pointed out striking structural differences separating one of the specimens from the other two; these differences entirely justify the erection of a new genus, *Metaparagia*, into which two previously described species, e. g. *Paragia pictifrons*, Smith, and *P. maculata*, M.-Waldo, must be transferred. The presence of mesonotal furrows in *Paragia* is not mentioned by Saussure, and by Smith only in the description of *P. tricolor*. Dalla Torre makes no mention of this character in his diagnosis of *Paragia* ('Genera Insectorum,' Vespidæ, p. 4).

### Metaparagia, gen. nov.

*Paragia* similis, sed differt oculis distincte emarginatis; mesonoto sulcis longitudinalibus nullis.

Type, *Paragia pictifrons*, Smith.

### *Metaparagia doddi*, sp. n.

♀. Niger; clypeo, mandibulis (apice excepto), scapo, fascia vertice, sinuque orbitali, macula postoculari, pronoto antice et postice, maculis subquadratis pleuris, macula media lineolisque duabus postice mesonoto, tegulis, scutello postice, angulisque lateralibus segmento mediano, flavis; segmento abdominali primo late postice, segmento secundo macula quadrata margine postico, segmento tertio dorsali late et ventrali omnino, segmentis quarto et quinto postice et segmento sexto omnino, flavo fasciatis; pedibus flavis; alis pallide fuscis.

Clypeus truncate, rather broader than long; inner orbits with a distinct emargination; pronotum rounded anteriorly, median segment truncate, lateral angles subtuberculate; abdomen elongate-ovate, first abdominal segment rounded basally and not constricted apically.

Punctured, the head and thorax (especially the disc of the mesonotum) coarsely, clypeus and abdomen more finely. A sparse pale pubescence on the vertex of head, median segment, and abdomen.

Length 9 mm. (to apex of second abdominal segment).

*Hab.* Cairns, N. Queensland (*F. P. Dodd*); 1 ♀.

Very near to *Metaparagia pictifrons*, Sm., from which it differs chiefly in the colour-pattern. The totally yellow clypeus, together with the yellow spots on the disc of the mesonotum and the second abdominal segment, should serve to separate the species at a glance.

*Key to the Species of* Metaparagia.

A. First abdominal segment strongly constricted at apex, and first recurrent nervure interstitial with first transverse cubital nervure.. *maculata*, M.-Waldo.
B. First abdominal segment without constriction, both recurrent nervures received by second cubital cell.
*a*. Clypeus and mandibles totally yellow .... *doddi*, sp. n.
*b*. Clypeus black, with two small yellow spots at base; mandibles ferruginous ..... *pictifrons*, Smith.

## Paragia, Shuck.

### *Paragia hirsuta*, sp. n.

♂. Niger: clypeo (lateribus apiceque exceptis), macula interantennali, mandibulis basi, oculis margine interno linea brevi, macula postoculari, pronoto angulis, mesopleuris, mesonoto, scutelloque lateribus maculis flavis; tegulis ferrugineis; abdomine nigro, segmento secundo dorsali irregulariter, segmento tertio et dorsali et ventrali apice, segmentoque quarto dorsali apice anguste flavo-fasciatis; segmentis quinto sextoque apice ferrugineo fasciatis, segmento septimo omnino ferrugineo; pedibus nigris; tibiis tarsisque ferrugineis, femoribus intermediis apice flavo variegatis; alis hyalinis, margine costali infuscato.

The yellow fascia on abdominal tergite 2 is near the base of the segment.

Clypeus subtriangular, truncate; head as broad as thorax at tegulæ; mesonotal furrows arcuate, widening and approximating posteriorly; scutellum prominent, subquadrate, covering postscutellum; median segment truncate, lateral angles subtuberculate. Abdomen with the first segment considerably narrower than the second; a deep constriction is visible from a lateral view. Whole insect covered with long fulvous pubescence, least noticeable on abdominal segments 2 and 3. Punctured, head (except clypeus), thorax, and first abdominal segment coarsely, the punctures on mesonotum running into striæ; clypeus and abdominal segments 2–7 finely.

Length 11¼ mm.

*Hab.* Cairns, N. Queensland (*F. P. Dodd*); 1 ♂.

This species comes nearest to *P. deceptor*, Sm., of which species the unique type is a female, but has the markings yellow, not reddish orange. The punctures on the mesonotum of *P. deceptor* do not run into striæ.

*Paragia perkinsi*, sp. n.

♀. Niger; antennis infra, clypeo basi, macula interantennali, oculis margine interno, macula postoculari, pronoto angulis, flavo-rufis; abdomine nigro, segmentis dorsalibus secundo et tertio lateribus apice late, segmento ventrali secundo duabus maculis flavo-rufis; segmentis dorsalibus quarto et quinto plerumque, segmento sexto omnino flavis; pedibus nigris, tibiis tarsisque ferrugineis; alis hyalinis, margine costali infuscato.

Clypeus subtruncate, as broad as long, somewhat produced towards apex; head as broad as thorax; mesonotum with two small tubercles on the disc; scutellum prominent, narrowing somewhat posteriorly, median segment with a conspicuous tubercle on each side, surface of truncation of median segment with two shallow parallel furrows.

First abdominal segment not constricted at apex. The whole covered with a sparse fulvous pubescence, most conspicuous on the legs.

Punctured, head, thorax (except median segment and postscutellum) coarsely; postscutellum, median segment (both laterally and on the surface of truncation), and first abdominal segment more finely, remaining abdominal segments very sparsely punctured.

Length 12½ mm. (to apex of second abdominal segment).

*Hab.* Cairns, N. Queensland (*F. P. Dodd*); 1 ♀.

I have much pleasure in naming this species after Dr. R. C. L. Perkins, by whom all three new species were presented. The species comes into my key to the genus (Ann. & Mag. Nat. Hist. (8) v. p. 31, 1910) after A. $b^2$, the most nearly allied species being *P. odyneroides* and *P. bidens*, the two species in which the whole thorax with the exception of the pronotal angles is black. *P. perkinsi* differs from them in having the first abdominal segment at apex as broad as the second abdominal segment at base (group *Alpha*, Dalla Torre), whereas the first abdominal segment in the nearly allied species is distinctly narrower than the second, and divided from it by a constriction (group *Beta*, Dalla Torre). *P. perkinsi* is a larger insect.

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## LXXXVII.—*Some probable and possible Instances of Warning Characteristics amongst Insectivorous and Carnivorous Mammals.* By R. I. Pocock, F.R.S.

The views put forward in the following pages are an extension of those I have already published in the 'Proceedings of the Zoological Society'* on warning attributes in porcupines and musteline carnivora.

* P. Z. S. 1906, p. 902 (on porcupines); 1908, pp. 944–959 (on musteline carnivora); 1911, pp. 559–560 (on *Putorius nigripes*).

It is well known that although cats will kill common shrews, they will not eat them. This, it has long been believed, is due to the rank and powerful musky scent which, to quote J. G. Wood, saturates the flesh of these insectivores. To their unpalatability the author just mentioned tentatively ascribes the frequent discovery of dead shrews lying about in exposed places in the autumn. It is, indeed, within the experience of every resident in the country that dead shrews may commonly be seen, whereas dead voles and field-mice, which are palatable, are comparatively rarely observed. To what extent shrews are protected from destruction by their scent, if, indeed, they are protected at all, is not, I believe, known. Owls will certainly kill and eat them; but there is no proof that carnivorous mammals, like weasels, stoats, and foxes, not to mention snakes, will do the same. Many birds, for instance, will eat nasty-smelling ground-beetles, which mammalia, with their keen olfactory sense, will not touch. Nor must it be inferred that weasels and stoats kill shrews, because cats do so. Cats always catch mice and other small swift-running prey with their paws, not with their mouths. They do not therefore, it may be supposed, get the full odour or flavour of the shrews they pounce on, until attempting to eat them; weasels, stoats, and foxes, as well as snakes, on the other hand, seize prey with their mouths, and it is possible that in this circumstance may be found a protective significance for the scent-glands of shrews of the genus *Sorex*.

Although shrews are procryptically coloured, it is known that "when moving about [they] frequently utter a series of shrill squeaking cries," as recorded by Major Barrett-Hamilton*. These squeaks I have myself heard when watching shrews hunting about in the woods in broad daylight; and the possibility of the sounds being a means of advertisement, serving to distinguish shrews from mice, must be borne in mind. At all events, neither mice nor voles, so far as I am aware, behave in that way, but keep quite quiet, unless they are fighting together or about to be seized by an enemy. The behaviour of shrews in captivity is also very different from that of the rodents in question. Without handling or coaxing, they become tame with surprising rapidity; and this is due, I think, to innate fearlessness of disposition and not to speedy realization of the benevolent intentions of their captor. One that I possessed some years ago could be let out of his cage with perfect safety after a few days' imprisonment. He would run all about the mantel-piece, questing every inch of ground with his sensitive flexible snout; but he never made the slightest attempt to escape or to hurry, and was quite unresponsive to sudden movements or sounds, such as would

* 'A History of British Mammals,' pt. viii. (1911).

startle a mouse or vole into seeking safety with a wild dart or leap, or reduce him in a moment to a state of complete but watchful quiescence, awaiting developments.

Although I am disposed to think the difference in behaviour between this shrew and small rodents may very likely be a question of palatability, I have no proof of the fact; and I merely suggest that this species of insectivore comes into the category of self-advertising mammals. But since this animal is not silent and possesses scent-glands which make it unpalatable to cats and, according to Wood, to other animals, it is evident that the species has the essential attributes that underly advertisement in other mammals. The same is true, I suspect, of all the small white-toothed shrews of the genus *Crocidura*, and it appears to me that there is convincing evidence that some of the larger forms of this genus are protected self-advertisers.

Many writers have testified to the strength of the odour emitted by the large Indian musk-shrew (*Crocidura cærulea*) —the "musk-rat of English residents—and to its habit of squeaking when wandering abroad after nightfall. The same or a closely allied form, known to the Chinese as "Chi-ch, oó," or money-rat, is described by Mr. Swinhoe * as living in houses in China, Formosa, and Hainan. It has an unpleasant and persistent musky odour and makes a peculiar chattering noise, like the jingling of money, when roaming about at night. But I know of no account of the Indian species so full of interesting collateral details as that given by Lt.-Col. D. D. Cunningham, F.R.S., who says †:—

"Every one in India is familiar with the great musk-shrews, or 'musk-rats' . . . . who are constantly invading houses and leaving unpleasant evidence of their visits in an overpowering and all-pervading musky odour. They are strange-looking creatures at any time, and particularly so whilst running about a garden in late dusk, *when their pallidly bluish-grey coats look as though they had been smeared with luminous paint and stand out conspicuous amid the surrounding gloom.* Soon after sundown they begin to come out and run busily about beneath the shrubs and among the long grass, *constantly uttering shrill, twittering cries,* that sound more like those of a bird than a mammal . . . . they fearlessly enter rooms in pursuit of [their prey] . . . . When they come in, they usually skirt along in the angles where the walls and floor meet, coursing along, *scuffling and*

* 'The Zoologist,' 1858, p. 6224.

† 'Some Indian Friends and Acquaintances,' pp. 284-285. London: John Murray, 1903.

*squealing as they go* . . . . If they be left unmolested, they are quite inoffensive . . . . *but if they be in any way alarmed or disturbed during their progress, the air is forthwith filled by an intolerable smell of musk that adheres persistently to everything* that they may come in contact with. It seems to be as offensive to most dogs as to human beings, and is doubtless a most effectively protective agent. *Many dogs, although eager to pursue musk-shrews, absolutely refuse to touch them*, and those who cannot resist doing so in the excitement of the chase show unequivocal signs of disgust and shame over the consequences."

This account, be it observed, was written by a highly competent naturalist, bent on describing, without embellishment, hypothesis, or explanation, the habits of a familiar Indian animal ; and it contains no suggestion that the writer was familiar with theory of animal advertisement. Yet the passages I have italicised supply all the facts necessary for the belief that the shrews in question are protected self-advertisers. They emit an intolerable stench when disturbed or alarmed ; are abhorrent to many dogs ; are fearless in their behaviour ; constantly utter shrill cries as they move about ; and are conspicuous in the dusk. In other words, we have in this species distastefulness associated with fearlessness of exposure and with advertising attributes that appeal to the sight, hearing, and scent of possible enemies.

Judging from the analogy supplied by the porcupines, I long ago inferred that hedgehogs with their protective armature of banded spines are coloured so as to be conspicuous in the dusk. It is, indeed, a matter of common knowledge that they are comparatively easy to see at night on account of their colour and easy to catch on account of their habit, when touched, of stopping to roll up, instead of attempting to run away like all unprotected mammalia.

Evidence that they sometimes produce a violently offensive smell is supplied by Mr. C. B. Moffat, who informed Major Barrett-Hamilton that he put a hedgehog into a water-butt to see it swim. "Immediately on finding itself in the water, the animal filled the whole surrounding air with an effluvium so awful that I had to run back five or six yards to find an atmosphere I could breathe . . . . I am not morbidly sensitive to odours, but this experience beat anything on the part of a live animal that I had ever encountered before or since . . . . A fairly strong odour is sometimes produced when hedgehogs are fighting at night, but this is nothing whatever to the stench made by the animal that I put in water . . . . It puts a good deal of trust in its own immunity from attack,

for, when moving about by night, it does advertise its presence by sounds, making a furious sniffing with its nostrils and also rustling among the leaves and herbage in a way that no other small animal could do without great unwisdom. One can easily track hedgehogs, I think from a distance of forty yards, by the perpetual noise they thus keep up, which tells us both where and what they are" *.

As Major Barrett-Hamilton has pointed out, many exotic hedgehogs, inhabiting areas, be it noted, where possible enemies are more numerous and varied than in Britain, are whiter than English examples. Apart from the spines the whiteness is particularly manifest over the forehead and sides of the head, which are exposed to view when the animal is prowling about on the feed with the head thrust forward. Egyptian and South African hedgehogs (*E. æthiopicus* and *E. frontalis*) are good instances of this. I have elsewhere † published a considerable amount of evidence supporting the theory that white on the top of the head or back in nocturnal animals makes them conspicuous at night against dark ground.

It is perhaps necessary to point out that the positive evidence supplied by Mr. Moffat of the power of the hedgehog to emit an objectionable scent outweighs all the negative evidence that may be brought forward of their being innocuous to human nostrils. No one probably will claim that the faculty in the case cited was individual. If one specimen had the power, which seems indisputable, then all examples of the species, if not of the genus, have it. In all the stinking mammals that have come under my notice, the reluctance to make use of their scent-glands, unless aggressively interfered with, is very striking. Skunks, zorillas, and ratels can be quite safely exhibited in cages. Now and again newly arrived specimens may make things unpleasant for the keeper for a short time, but they soon become accustomed to people and show themselves to be docile in disposition. Even such powerful beasts as ratels are never aggressive or frightened and are often easily tamed; and zorillas are known to be kept as pets in South Africa for their vermin-destroying propensities.

Critics of the claim that hedgehogs belong to the category of advertising mammals will probably point out that eagle-owls, badgers, and foxes, sometimes at all events, eat them

* Mr. Moffat's experiences are quoted and the aposematic attributes of hedgehogs in general are discussed in Major Barrett-Hamilton's 'A History of British Mammals,' pt. vii. p. 59, June 1911.

† P. Z. S. 1908, pp. 944–959.

and that some dogs can be trained to kill them. This is, of course, not disputed. But if this fact be used as an argument against the theory of advertisement, it must logically also be used as evidence against the view that the animal's spine-armature is protective. No one, however, will, I imagine, make such a claim. We know, in fact, that the spines are protective by the way they baffle the efforts of any ordinary dog to kill this insectivore; and rats that I have more than once seen pitted against hedgehogs in a cage had no chance, if the hedgehogs wished to fight; and although the rodents bravely attempted to defend themselves at first, they soon desisted and directed all their efforts to escape. I have also seen rats on the floor of a room run after hedgehogs and dart at their hind-quarters to bite them; but the attempt was never, within my experience, repeated more than once or twice *.

I suspect that badgers and foxes do not eat hedgehogs unless pressed by hunger; as I also suspect that lions, tigers, leopards, and pumas leave the porcupines of their respective countries alone, unless other game is scarce or, for any reason, unprocurable. But even if the insectivore and rodent specified are habitually eaten by the carnivora mentioned, there is no reason to suppose that the former are not protected from smaller predaceous animals; and in the category of possible enemies, reptiles and birds must be reckoned as well as mammals.

Belonging to the same family as the hedgehogs, but devoid of spine-armature, is the Oriental genus *Gymnura*. There is abundance of evidence, in my opinion, that this animal is warningly or conspicuously coloured. The prevailing colour of the head, neck, the fore part of the back, and of the shoulders is white, relieved by a black stripe over the eye, while the rest of the body and the limbs are mostly black. Entirely white individuals are, moreover, not infrequently met with. Since the animal is nocturnal, terrestrial, and an inhabitant of well-wooded localities, it can hardly be doubted that its whiteness makes it conspicuous after dark upon the dark soil. That *Gymnura rafflesi* possesses malodorous scent-glands has been known for very many years. According to Blanford, it "has a peculiar offensive smell .... described .... by Mr. Davison as resembling Irish stew that has gone bad." In the 'Royal Natural History' the smell is described as peculiarly disagreeable and of a somewhat oniony or

* In the 'Field' for Oct. 29, 1911, there is, however, an instance quoted of a brown rat killing a hedgehog.

garlic-like nature. Probably it may be compared to the scent of porcupines, which has been likened to that of human perspiration. The combination of the objectionable smell with the partial or complete whiteness of the coloration, and nocturnal habits, and insect diet justifies the opinion that this animal is distasteful, like the musk-shrew, although, so far as I am aware, there is as yet no actual experimental evidence of the fact.

There is one Æluroid carnivore which may be claimed with some assurance, I think, as warningly coloured. This is the so-called crab-eating mongoose (*Mungos urva* or *cancrivora*) of Assam, Burma, and Southern China. The typical mongooses have annulated fur, giving them a characteristic and uniformly speckled appearance; but the prevailing colour of *M. urva* is paler grey above, owing to the long white tips of the hairs. The head is darkish brown, ticked with white, and there is a conspicuous white stripe, set off by the dark tint of the throat, running backwards from the angle of the mouth to the shoulder. The legs are dark brown or nearly black. In the combination of colours above described, this species departs widely from typical members of the genus. It also differs from them in habits. According to Hodgson * it makes use of the secretion of the anal glands in the same way as the skunk. Hodgson described this secretion as "aqueous, horribly fœtid, and projectile (*sic*) to a great distance by the living animal." Coupling this habit with the light tint of the body and bushy tail, and with the presence of the well-marked white stripe on each side of the neck, it is obvious to suggest, in view of the prevalence of pale coloration on the upperside of such mammals as the badger and ratel, that the coloration of the crab-eating mongoose makes for conspicuousness. And since this species feeds mostly, according to Hodgson, upon crabs and frogs, for the capture of which procryptic coloration can hardly be necessary on account of the indifferent visual powers of these animals, it can scarcely be claimed that the dark head and white neck-stripes of the mongoose are subservient to the purpose of concealment from prey.

Some of the members of the civet family have a very strong scent, notably the rasse (*Viverricula malaccensis*), whose smell, exactly resembling that of the urine of *Mus musculus*, can be detected by the human nose at a considerable distance. Presumably this smell proceeds from the

* Journ. As. Soc. Bengal, vi. pt. 2, pp. 563–565 (1837); see also Blanford, 'Fauna of British India: Mammalia,' p. 130 (1888).

glands which in civets and genets are lodged between the scrotum and the penis in the male, and in the perineal region in the female. There is no evidence that this scent is nauseous to larger carnivora; but if not it is singular that the rasse should so persistently advertise its presence, at all events in captivity, by its odour, my experience being that it smells at all times and not specially under the stimulus of fear. Nevertheless the rasse is procryptically coloured; and on the evidence available cannot be claimed as a protected self-advertiser. The possibility of its being distasteful must not, however, be forgotten.

Palm-civets of the genera *Paradoxurus* and *Paguma* also have great powers of scenting a house, yet they appear for the most part to be procryptically coloured. It is perhaps, however, significant that the common Indian species (*Paradoxurus niger*) is addicted to albinism, as recorded by Blanford; and more than one example with a considerable quantity of white on the body has come under my notice. Moreover, Lt.-Col. Cunningham, in the work already cited (p. 277), speaks of them as being "wonderfully fearless animals," and adds that "their eyes are strangely luminous in dim light, much more so than those of almost any other animal, save death's-head moths." Since these palm-civets are nocturnal animals, the possibility of the luminosity of the eyes acting as an advertisement of unpalatability is worth bearing in mind.

Finally, there is one species of this group, the so-called masked palm-civet (*Paguma larvata*) of Southern China, which is very singularly coloured. The whole body is greyish yellow, but the head and neck are jet-black, with a snow-white median stripe running from the nape to the nose, a large white patch in front of each ear, and a smaller spot above and below each eye. This contrast between jet-black and snow-white on the head is so forcibly reminiscent of what may be seen on this region in badgers and on the back in zorillas and skunks as to suggest identity of use. Masked palm-civets also resemble badgers in being nocturnal and omnivorous in diet. Nevertheless, I have no direct evidence that they are in any way noxious, although they possess both anal and perineal glands; but such evidence is difficult to obtain in specimens like those I have observed alive, which were tame, either from being born in the Zoological Gardens or from having been long in captivity before importation.

LXXXVIII.—*New Mammals from Central and Western Asia, mostly collected by Mr. Douglas Carruthers.* By Oldfield Thomas.

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*Sorex centralis*, sp. n.

A large member of the *S. minutus* group.

Most nearly allied to *S. annexus* and *macropygmæus* (with the latter of which I believe *S. buxtoni* to be synonymous), but larger than either and with a longer muzzle. General colour above dark broccoli-brown, with a slight olivaceous tinge; sides paler, an upper line of demarcation perceptible in one specimen, but there is usually no trace of a tricolor pattern. Under surface washed with drabby grey. Ears densely hairy. Tail brown above, whitish below, its terminal pencil about 6 mm. in length.

Skull larger and with longer muzzle than that of the allied species. Brain-case broad, with well-marked lateral angles. Sagittal and lambdoidal crests unusually well developed, more so than in any other shrew known to me; but the specimens are all rather old, with worn teeth. Supraorbital foramina prominent. Lacrymal foramen over middle of $m^1$.

Teeth with the essential characters of those of the *minutus* group; the series of unicuspids even more uniform than usual, the two last practically equal in height and area, but little smaller than the third, the first two only slightly larger than the last named. As a result of the greater size of the last two unicuspids the muzzle and anterior part of the tooth-row are disproportionally longer than in the allied species.

Dimensions of the type (measured in flesh) :—

Head and body 63 mm.; tail 39; hind foot (s. u.) 12; ear 9. The males range up to 68 mm., with tail to 41; all have hind foot 12.

Skull: condylo-incisive length 19·3; condylo-basal length 18·6; greatest breadth 9·2; height of brain-case 5·3; length of upper tooth-row 8·4; front of $i^1$ to back of last unicuspid 4·3; breadth between outer corners of $m^1$ 4·4.

*Hab.* Syansk Mts., 100 miles W. of Lake Baikal. Alt. 4000′.

*Type.* Old female. Original number 180. Collected 23rd June, 1910, by Douglas Carruthers. Four specimens.

This species forms with *S. macropygmæus* and *annexus* a group of shrews with the essential characters of *S. minutus*, but equalling *S. araneus* in size. It may be distinguished from its two allies by the proportionally greater size of the posterior unicuspids and its longer muzzle; it is also slightly larger than either of them, as gauged by its cranial dimensions.

*Microtus agrestis mongol*, subsp. n.

Like the European *M. agrestis*, but with much larger bullæ.

External characters as in *agrestis*, the colour slightly paler than in Norwegian specimens of that animal. Under surface washed with dull buffy greyish.

Skull apparently similar in all respects to that of true *agrestis*, except that the bullæ are decidedly larger, more fully inflated, closer together mesially, and standing up higher above the basis of the skull. Teeth quite as in *agrestis*, the extra prism on $m^2$ well developed.

Dimensions of the type (measured in flesh):—

Head and body 98 mm.; tail 32; hind foot (s. u.) 18; ear 12.

Skull: condylo-incisive length 26; basilar length 23·2; zygomatic breadth 14·5; nasals 7·2; interorbital breadth 3·7; palatal foramina 4·7; length of bulla 8; upper molar series (crowns) 5·8.

*Hab.* Kemtchik Valley, Tannu-ola Mts., N.W. Mongolia. Alt. 4200′.

*Type.* Adult male. Original number 188. Collected 4th August, 1910.

Considering its locality, this animal is surprisingly like the true *M. agrestis* of Scandinavia, differing, so far as I am able to see, only by its larger bullæ. No Asiatic vole allied to it and possessing five prisms on $m^2$ has been described.

*Evotomys glareolus saianicus*, subsp. n.

♂. 158; ♀. 163. Syansk Mts., 100 miles W. of Lake Baikal. 1600′.

(?) ♀ (young). 172. Syansk Mts., 100 miles W. of Lake Baikal. 1600′.

Size rather small. Colour very much as in the dark races of *E. glareolus*, *E. g. britannicus*, and *suecicus*. The rufous area of the back, however, is narrower, so that the grey of the sides shows more in the upper aspect; the head also is greyer and less rufous. Sides and under surface dark grey in the

adults, but quite light silvery grey in the young specimen. Belly with but little buffy suffusion.

Skull small, its brain-case rather shorter than in European *glareolus*.

Dimensions of the type (measured in flesh) :—

Head and body 95 mm.; tail 50; hind foot 16; ear 13.

Skull: condylo-basal length 23; zygomatic breadth 13; nasals 6·2; interorbital breadth 3·6; brain-case, from line at back of olfactory fossa to hinder edge of interparietal 10·8; palatilar length 11; palatal foramina 4·8; upper molar series (crowns) 5·0.

*Hab.* Syansk Mts., 100 miles W. of Lake Baikal. Alt. 1600′.

*Type.* Adult female. Original number 163. Collected 7th June, 1910.

This representative of *E. glareolus* is quite unlike the Central European forms of that species, but more resembles the races inhabiting Scandinavia and Great Britain. It is, however, distinguishable by the reduction of the rufous area of the upper surface, the grey areas being larger, and by its smaller brain-case. It seems to have no special relationship to the Thian Shan species, *E. centralis* and *frater*.

*Ochotona* (*Ogotoma*) *pricei*, sp. n.

A small pale species. Back of ear concolorous with head.

Most nearly related to *O. ladacensis* and *O. pallasi*. Size smaller than in those species. Fur of medium length; hairs of back (summer) about 14 mm. in length. General colour above buffy (between "cream-buff" and "buff"), the brighter parts on shoulders and rump quite "buff." Extreme points of hairs dark brown. Sides and under surface creamy whitish, the plumbeous bases of the hairs showing through. Crown stronger buffy, almost tending towards ochraceous buffy. A light creamy-buff collar between ears, perhaps due to bleached winter hairs still in position. Ears with outer side (ectote) grey, the edge cream-buff; inner side clothed with rather long (5 mm.) cream-buff hairs with dark brown tips. Hands and feet cream-buff, palms and soles similar, but darkened by the brown bases of the hairs showing through.

Skull with the same general characters as that of *O. pallasi* and *ladacensis*, but smaller. Frontal profile less bowed, so that the species tends to reduce the gap between *Ogotoma* and *Pika*. Nasals coalesced. Interorbital space narrow, but not

excessively so. Bullæ partly visible from above, the parietals, owing to the lesser obliquity of the parietal plane, not completely hiding them as is the case in *O. ladacensis*. Incisive and palatal foramina completely separated, the latter subequal in breadth throughout and abruptly truncated anteriorly, as in *O. pallasi*, not gradually narrowing forwards as in *O. ladacensis*. Bullæ large, as in *O. pallasi*.

Dimensions of the type (measured in flesh) :—

Head and body 178 mm.; hind foot 29·5; ear 20.

Skull; occipito-nasal length 46·8; condylo-incisive length 43·6; zygomatic breadth 24; nasals 15·8; interorbital breadth 4·1; parietal breadth 19·6; palatilar length 17·5; palatal foramina 8·6; upper cheek-tooth series (alveoli) 9·5.

*Hab.* Mountains W. of the Atchit Nor, in the Kobdo Basin, N.W. Mongolia (about 90° E., 49° 30′ N.). Alt. 6700′. Another specimen from Suok, 8000′.

*Type.* Adult female. Original number 208. Collected 28th August, 1910, by Douglas Carruthers. Three specimens examined.

The only near relatives of this pretty Pika are *O. pallasi*, Gray, and *O. ladacensis*, Günth., but both are decidedly larger, and have their skulls more "humped" in the frontal profile. *O. ladacensis* is also readily distinguishable by the rufous or ochraceous backs to its ears. The summer pelage of *O. pallasi* is unknown, but in the winter coat it is greyish throughout, with but little tinge of buffy.

*Ochotona dauurica altaina*, subsp. n.

Apparently quite similar to true *dauurica*, with the exception that the feet are larger. Colour averaging a little paler and greyer. Under surface rather whiter, the hairs with a longer slaty basis. Skull slightly larger.

Dimensions of the type (measured in flesh) :—

Head and body 182 mm.; hind foot, s. u. 32·5, c. u. (on skin) 37; ear 22·5.

Skull: occipito-nasal length 46; condylo-incisive length 44·2; zygomatic breadth 23; nasals 16; interorbital breadth 4·8; parietal breadth 18.

*Hab.* Atchit Nor, N.W. Mongolia. Alt. 4500′. Other specimens from Suok on the eastern slope of the Great Altai, 7000′.

*Type.* Adult male. Original number 205. Collected 27th August, 1910. Six specimens.

The series of specimens have the hind foot measurements (s. u.) as follows: 29, 29, 30, 30·5, 31, 32·5 mm., while a set from Taboul, Mongolian Plateau, towards the eastern end of

the range of *O. dauurica*, collected by M. P. Anderson, have it 26, 26, 27, 27, 27, 27·5, 28, 28, 29, so that there is evidently a general average difference between the two forms. Büchner gives, for specimens from Urga, not far from the typical locality, 30·5, 31, and 33 *cum ungue*, which, if 4 mm. is taken off for the claw, make 26·5, 27, and 29, thus corresponding closely with the Taboul set. An example said to be from Amur-land (*Frank*) has the hind foot 26 (s. u.).

*Ochotona rufescens regina*, subsp. n.

Similar to true *rufescens* in all essential respects, but size larger, as gauged by skull. Bullæ at a maximum.

Dimensions of the type:—

Hind foot (s. u.) 37 mm.; ear, from base of outer edge (dry), 20.

Skull: occipito-nasal length 51·5; condylo-incisive length 48·4; zygomatic breadth 25; nasals 16·6; interorbital breadth 3·2; parietal breadth 20; palatilar length 19·2; palatal foramen 15·5; bullæ, horizontal antero-posterior length 13·3, oblique diameter on side aspect (upper anterior to lower posterior edge) 11·7.

*Hab.* Kopet Dagh, west of Ashabad, Transcaspia. Alt. 3000′.

*Type.* Adult. B.M. no. 2. 9. 31. Collected 15th August, 1902, and presented by St. G. Littledale, Esq.

*Ochotona rufescens vizier*, subsp. n.

Size smaller than in true *rufescens*; ears shorter, bullæ smaller. Colours tending to be rather brighter and more contrasted.

Dimensions of type:—

Hind foot (s. u.) 31 mm.; ear, from base of outer edge (dry), 16.

Skull: occipito-nasal length 44·5; condylo-incisive length 39·5; zygomatic breadth 22·3; nasals 14; interorbital breadth 4·1; parietal breadth 17; palatilar length 16; bulla, horizontal antero-posterior length 11; oblique diameter on side aspect (upper anterior to lower posterior edge) 9·5.

*Hab.* Central Persia. Type from the Koh-rud north of Isfahan. Alt. 9000′.

*Type.* Adult female. B.M. no. 74. 11. 21. 5. Original number 560. Collected 20th July, 1872, by W. T. Blanford.

This Persian form of *O. rufescens* has so much smaller a skull than the more northern *O. r. regina* as to look quite a different species, but the typical, south-eastern, form connects the two.

## LXXXIX.—*Descriptions and Records of Bees.*—XL.

By T. D. A. Cockerell, University of Colorado.

### *Alcidamea hypocrita* (Cockerell).

*Osmia hypocrita*, Ckll., was described from a single female taken at Boulder, Colorado. The range of the species is very greatly extended by a female taken by Professor C. F. Baker at Claremont, California. In the collection of Pomona College is a male obtained at Durango, Colorado, May 21, 1899 (*Oslar*). The discovery of the male makes it necessary to refer the insect to *Alcidamea*, though it is an aberrant member of that genus.

♂.—Length about 10½ mm.

Similar to the female in colour and form, except for the usual sexual characters; cheeks, posterior part of thorax at sides, and abdomen above beyond second segment with black hair; face and front with long erect white hair; scape long and curved, not much thickened; flagellum long and slender, faintly brownish beneath except at base, last joint bent and sharply pointed; sixth abdominal segment with a rather short sharp median apical tooth (from which proceeds upwards a delicate keel) and on each side a broader tooth; seventh segment triangular, with a small truncate apical tooth, marked by a notch on each side; venter with short black hair, hind margin of first segment straight, of second produced to a lobe; hair of legs mainly black, but dull white on anterior legs behind, and reddish on inner side of tarsi. The hair of the thorax above is long and creamy white.

Easily known from *A. uvulalis*, Ckll., by the absence of the large projection on venter of abdomen; known from *A. biscutellæ*, Ckll., by the colour of the pubescence and the total absence of hair-bands on the abdomen.

### *Alcidamea simplex* (Cresson).

Fedor, Texas (*Birkmann*). Pomona College collection.

### *Hoplitis sambuci*, Titus.

Claremont, California (*Baker*). New to California.

The female is very like that of *H. mescalerium*, Ckll., but has black spurs; the head larger, especially in the occipital region, and the vertex and disc of mesothorax more closely punctured.

*Osmia clarescens,* sp. n.

♀.—Length about 9 mm.

Steel-blue, with white hair, mixed with long black hairs on face, vertex, and dorsum of thorax; hair of pleura and sides of metathorax entirely white. Legs very blue, inner side of tarsi with dark chocolate hair. Mandibles tridentate, but the inner tooth is broad and truncate and sometimes looks like two; clypeus normal; tegulæ largely blue. Wings strongly dusky; b. n. meeting t.-m.; apical part of abdomen above with a good deal of black hair; ventral scopa black, but glittering white hair at sides of abdomen.

♂.—Length about 7½ mm.

Similar to the female, except in the usual sexual characters; bright steel-blue, legs very blue; pubescence white, but mixed with long black hairs on face, vertex, and dorsum of thorax; hair of clypeus silky white, but on each side are some long black hairs; flagellum black; middle tarsi simple; hind basitarsi toothed. Apical part of abdomen with some black hairs among the light; sixth segment feebly notched, seventh bidentate; first ventral shallowly emarginate, third ventral with long white hair in the emargination, conspicuous when not hidden by the overlapping second segment.

*Hab.* Claremont, California (*Baker*); 28 ♀, 3 ♂. The type is a female.

The female greatly resembles that of *O. coloradella,* Ckll., but is easily separated by the black hair of head and thorax above. It may also be compared with *O. phaceliæ*, Ckll., from which it is known by the larger size and blue legs, and with *O. melanotricha,* Lov. & Ckll., from which it is known by the blue legs and black hair of thorax above. The male is extremely like *O. vallicola,* Ckll., but differs at once in the mandibles, which are rather strongly curved near the end, with a short apical tooth (little curved and with a long apical tooth in *vallicola*), and the long black hairs at sides of clypeus are wholly wanting in *vallicola.* It also closely resembles *O. wheeleri,* Ckll., but differs by the black hairs at sides of clypeus and the conspicuous short white hair on inner side of hind tibiæ.

*Osmia basilissa,* sp. n.

♀.—Length 9 mm. or slightly more.

Robust; magnificent deep purple, including the legs, with coarse entirely black pubescence; mandibles with two large outer teeth and a binodular short and broad inner one;

clypeus normal, lower margin black. Antennæ black; tegulæ purple. Wings strongly dusky; b. n. going just basad of t.-m.; hind spurs curved at end.

*Hab.* Claremont, California (*Baker*); 1 ♀.

Looks like *O. cobaltina*, Cresson, but is broader and shorter, with the dorsal hair of thorax all black. Compared with *O. sanctæ-rosæ*, Ckll., it is much broader, more thick-set, and the rich purple colour is quite different from the deep blue of *sanctæ-rosæ*.

*Osmia platyura*, sp. n.

♂.—Length about 10 mm.

Narrow, with parallel-sided abdomen; head, thorax, and legs brilliant emerald-green, or the mesothorax suffused with blue; abdomen brilliant green or (var. *a*) brilliant blue-purple, more or less suffused with green; pubescence white throughout, except on inner side of tarsi, where it is yellowish. Head round seen from in front, eyes very large, face narrow; mandibles broadly green at base; scape largely green; flagellum long, ferruginous beneath; mesothorax and scutellum densely punctured; tegulæ shining green. Wings dusky brown; b. n. meeting t.-m.; first r. n. joining second s.m. near base; marginal cell long. Tarsi normal; spurs dark. Abdomen closely punctured, with very little hair above, but the segments beneath conspicuously fringed with white hair; sixth dorsal segment simple in middle, but toothed at each extreme side; seventh very large and flat, forming a broadly rounded apical plate; second ventral more or less keeled, the keel prominent at apex, where it ends in a point; third ventral broadly truncate, the truncate edge more or less concave.

♀.—Length 8–9 mm.

Like the male, but shorter; the green form bluer green, the purple (which may include head and thorax) apparently as common as the green; head oblong, the face much longer than broad, occipital region strongly developed; mandibles greenish at base, with two strong teeth, and a broad, feebly developed, binodulose inner one; scape green, flagellum dark, obscure reddish beneath; pubescence scanty, fuscous; ventral scopa black; tegulæ about two-thirds green; hair on inner side of tarsi dark chocolate.

*Hab.* Type (♂) from mountains near Claremont, California (*Baker*). Other males from Claremont, California (*Baker*), and Ormsby County, Nevada (*Baker*). Seven females from Ormsby County, Nevada (*Baker*).

Related to *O. fulgida*, Cresson, which has a larger female, and in the male has the broad seventh segment evidently pointed. Also closely related to *O. viridimicans*, Ckll., which is much larger; they agree in having the lower part of metathoracic area smooth and shining. In female *viridimicans* the pubescence is entirely black, in *platyura* it is various shades of fuscous, sometimes rather pale. These insects are intermediate between *Osmia* and *Monumetha*.

*Osmia regulina*, sp. n.

♀.—Length about 8 mm.

Robust, with subglobose abdomen; brilliant green, suffused with blue and purple; head large, face broad, with fine white downy pubescence and longer slightly brownish hairs; hair of head and thorax white, the long dorsal hairs somewhat fuscous or yellowish; clypeus and adjacent sides of face purple, the lower margin of clypeus black; scape black, flagellum dark reddish beneath; mesothorax densely confluently punctured; tegulæ punctured, green, with a dull fuscous spot; area of metathorax granular. Wings very dusky, b. n. meeting t.-m.; first r. n. joining second s.m. far from base, marginal cell comparatively short. Legs black, with the femora largely green and the tibiæ purplish; hair on inner side of hind tarsi black. Abdomen dorsally with scanty pale hair, rather greyish on basal part of segments; apical segment fringed with dark greyish hair; ventral scopa black.

♂.—About 7 mm. long.

Blue-green, some greener, others bluer; hair of face long, entirely white; flagellum variably reddish beneath; tegulæ and legs green; sixth abdominal segment with a small notch, seventh bidentate; first ventral truncate, entire.

*Hab.* Type (♀) from Claremont, California (*Baker*). Males from Claremont and the adjacent mountains (*Baker*).

Very close indeed to *O. kincaidii*, Ckll., but distinguished in the female by the paler pubescence, the confluently punctured mesothorax, and the less metallic legs. The male is bluer, with the hair above hardly ochreous. The male is also close to *O. ednæ*, Ckll., but the latter is rather larger, of a brighter yellower green. In the greenest males of *O. regulina* the hind margins of the segments are blue-green and the surface-sculpture of the segments is quite coarse.

*Osmia ednæ*, Cockerell.

Males from Claremont and the adjacent mountains and a female from Claremont (*Baker*) can only be referred here.

The female, not before known, is very like that of *O. regulina*, but the abdomen is narrower, with conspicuous black hair dorsally, there are long black hairs on the head and thorax above, and the clypeus has a good deal of coarse black hair. The mesothorax is very strongly punctured, and the abdomen is very blue. This female is very like the smaller specimens of *O. cobaltina* (variety with green head and thorax), but has thin white hair right across the lower part of face, best seen from above. It is possible that I am in error in ascribing this female to *O. ednæ*, but I have no other plausible mate for it.

A bright green male from the mountains near Claremont (*Baker*), having the hind margins of the abdominal segments bluish, and the hair of the head and thorax above white, is placed as a variety of *O. regulina*, but it seems intermediate between that species and *O. ednæ*. Can it be a hybrid ?

*Osmia colbaltina*, Cresson.

This was based on females from Nevada and California, having the hair of the head all black. Six females from Ormsby County, Nevada (*Baker*), vary much in colour and size (one is only 7 mm. long), and several show a little pale hair at sides of face. Cresson did not describe the male of *cobaltina*, but Robertson holds that his *O. illinoensis* is its male. Since *O. cobaltina* is a species characteristic of the Pacific coast region, and is replaced in the Rocky Mountains by the closely allied and probably intergrading *O. bruneri*, Ckll., it seems very improbable that the Illinois *O. illinoensis* can be its male. The male of *O. bruneri* is known to me, and has much coarse black hair on the clypeus &c., whereas *O. illinoensis* has the hair of the clypeus all white.

*Osmia kincaidii*, Cockerell.

Three males from mountains near Claremont, California (*Baker and Crawford*), one female from Claremont (*Baker*). These belong to the smaller race mentioned in the original description. The femora and tibiæ of the female are bright green.

*Osmia bennettæ*, Cockerell.

Males from Claremont and adjacent mountains (*Baker*).

*Osmia granulosa*, sp. n.

♀.—Length 7–7½ mm.

Brilliant deep purple, varying to blue-green ; ventral

scopa entirely pale yellow or (var. *a*) dark fuscous, shining yellowish in certain lights; head broad; hair of head and thorax white, nowhere mixed with black or fuscous, but that on vertex distinctly brownish, that on face slightly brownish, and that on lower edge of clypeus shining pale golden; antennæ black; tegulæ purple, punctured near margin; femora, tibiæ, and hind basitarsus in part purple or green. Wings very dusky; first r. n. joining second s.m. far from base; abdomen short and broad, densely punctured.

♂.—Length about 6 mm.

Brilliant peacock-green; pubescence all white; flagellum very obscure brownish beneath; sixth abdominal segment feebly notched, seventh bidentate; first ventral entire; hind basitarsus with a small tooth about 270 $\mu$ from end.

*Hab.* Type female from mountains near Claremont, California (*Baker*); others (♂ ♀) from same locality, and female var. *a* from Claremont (*Baker*).

Compared with the female ascribed to *O. ednæ*, the present species differs at once by its minutely granular (finely punctured) abdomen, which is accordingly duller, though very brilliantly coloured. The male is a bluer green than that of *O. kincaidii*, being covered like the *kincaidii* female. The abdomen of the male is brilliantly shining.

*Chelynia subcærulea* (Cresson).

Cresson described this from a single male collected in California. In his catalogue published in 1887 he recorded it, possibly by mistake, as from Colorado and Nevada. A female from Ormsby County, Nevada (*Baker*), is quite as this sex of *subcærulea* might be expected to be, except for its small size, length about 6½ mm. The size of bees of this group is very variable, and no doubt this Nevada female is merely an unusually small specimen. The pubescence of the head and thorax is mixed black and pale, the black or dark fuscous preponderating. The ivory-coloured abdominal bands are reduced to a pair of widely separated short stripes on the second and third segments, and larger markings, clavate laterad, on the first; the fourth segment is without light markings. The strong punctures on the disc of mesothorax are more widely separated than in *C. elegans*. Cresson states that *C. subcærulea* is larger than *C. elegans*, but I believe both vary in size, with probably little or no difference. *C. elegans* has the thorax more densely punctured, and is perhaps confined to the Rocky Mountains, although Cresson in 1878 incidentally refers to its occurrence in California.

*Chelynia calliphorina*, sp. n.

♀.—Length about 8½ mm.

Deep rich indigo-blue, with slight green tints on the abdomen; hair of face mainly dull white, but many black hairs intermixed; flagellum obscurely brownish beneath; hair of vertex and thorax above more black than pale, of pleura black, mixed with pale above, of sides of metathorax black, with a white tuft above; head and thorax very coarsely punctured, the punctures well separated on disc of mesothorax; tegulæ blue, punctured. Wings very dusky; second s.m. very long, its basal corner much more produced than in *C. pavonina*. Legs dark blue, with dark hair; abdomen strongly but not densely punctured, its pubescence black; no abdominal bands or spots; ventral segments with a fine chocolate-coloured tomentum.

*Hab.* Mountains near Claremont, California (*Baker*).

Related to *C. pavonina*, Ckll., and *C. cusackæ*, Ckll., especially the latter, but easily known by the pale hair of the face. Some time ago Professor Pérez sent me a photograph of a Californian bee in his collection, which appears to be a *Chelynia*, and is probably *C. calliphorina*.

*Stelis carnifex*, sp. n.

♀.—Length about 8½ mm.

Deep rich purple, the vertex, mesothorax (except hind edge), and scutellum black or (Nevada specimen) dark blue; punctures strong, well separated on mesothorax; head oblong; scape purplish or bluish, flagellum obscure brownish beneath; tegulæ purple in front, and with a more or less pallid discal spot. Wings dusky (brownish), nervures dark; pubescence black. Legs dark purple. Abdomen with the first three segments strongly but not densely punctured, the others with large very dense more or less elongate punctures; ventral segments fringed with dark fuscous or black hair.

*Hab.* Type from mountains near Claremont, California (*Baker*). Also one from Ormsby County, Nevada (*Baker*).

Intermediate in size between *S. montana*, Cr., and *S. seneciophila*, Ckll., in colour different from either. The face is narrower than in the Rocky Mountain species.

*Prosopis xanthaspis*, var. *bicuneata* (Cockerell).

A female of *P. xanthaspis*, Ckll., from Mackay, Queensland, March 1900 (*Turner*), has a yellow patch on each side of the clypeus, thus approaching the condition of *P. bicuneata*. On reviewing the matter, I now believe that *bicuneata* is a variety of *P. xanthaspis*. A specimen of var.

*bicuneata* was collected at flowers of *Cassia*, Dec. 1899 (*Turner*, 13 *a*).

*Crocisa subramosa*, sp. n.

*Crocisa* sp. between *takaonis* and *ramosa*, Ckll. Ann. & Mag. Nat. Hist., April 1911, p. 311.

♀.—Length about 10 mm.

Stature and appearance of *C. ramosa* from France, but abdominal bands broader, the marks at sides of apical part of first segment pointed mesad, the hind edge diverging from the hind margin at an angle of 45°; lateral marks on second segment more curved upwards; tegulæ black. Wings very dark; marginal cell longer than in *C. ramosa*; other characters given at the place cited.

*Hab.* Foochow, China (*H. R. Caldwell*). U.S. National Museum.

*Crocisa surda*, sp. n.

*Crocisa* sp. near *kanshireana*, Ckll. Ann. & Mag. Nat. Hist., April 1911, p. 313.

♀.—Length 13–14 mm.

Characters as given in the place cited, but it is to be noted that the type has the inner edges of the hind margin of scutellum slightly flexuous, the character being evidently a variable one. Hair of abdomen very dull pale blue, with the basal band of first segment rather widely interrupted (though the interruption is less than half the distance between the posterior points of scutellum), but the apical band slightly interrupted; the pleura is light-haired, with a dark patch above, and a very large one lower down, entering the anterior margin; the wings are very dark, with the usual pale spots.

*Hab.* Foochow, China (*H. R. Caldwell*). U.S. National Museum.

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XC.—*A Vote against the Strict Application of the Priority Rule in Zoological Nomenclature.* (*With an Introduction by* Dr. Th. Mortensen.)

In the 'Zoologischer Anzeiger,' Bd. xxxvi. no. 24, Nov. 22, 1910, and in the 'Annals' for December 1910, is published a note from the International Commission on Zoological Nomenclature inviting all zoologists to send to the Secretary of the Commission a list of 100 zoological names which they

consider should be studied in connection with the preparation of an official list of generic names, and, further, to send a separate list of 50–100 generic names in their speciality which they look upon as the most important and most generally used ; each of these latter names should be accompanied by the full and complete original bibliographical reference, by the name of the type species, and the name of the order and family to which the genus belongs.

On the base of the study of the lists sent in the Commission promises to submit to the next Congress an *Official List of Generic Names,* with their genotypes, proposing that this list should be adopted and that in the future " no zoologist shall upon NOMENCLATORIAL grounds change any name in said list unless he first submits to the Commission his reasons for making the change and unless the Commission considers the reasons valid."

The lists should be sent in before Jan. 1, 1911.

This invitation was the result of a proposition presented to the International Commission on Zoological Nomenclature from the British Association for the Advancement of Science and the Eastern Branch of the American Society of Zoologists recommending *that certain very commonly used zoological names should be excepted from the Law of Priority.* The result shows that the Commission has found no reason to accept the proposition of the two Societies ; what the Commission proposes to construct on the basis of the hoped-for lists is by no means a list of names excepted from the Law of Priority—when valid nomenclatorial reasons are found for changing them, they may be changed with the permission of the Commission ! It has been found by the Commission that the desire to have the more important names excepted from the Law of Priority and protected against being changed is not so widespread and deeply rooted as is assumed by some zoologists. An effort made by the Secretary to collect from Zoologists the most commonly used and most important generic names has as yet met with such poor success that the conclusion does not seem entirely unjustified that some of our colleagues who may be in favour of such a list are not as yet sufficiently enthusiastic over the proposition to induce them to demonstrate their desire by placing into the hands of the Commission the data upon which such a list must of necessity be based. Further, there are many colleagues who are known to us to be directly and enthusiastically opposed to such a list. It may perhaps be allowed to suggest that the conclusions drawn from the results of the enquiries of the Secretary are not quite justified. That it is not seen to

whom the Secretary has applied may be of minor importance, but it should be pointed out that what the Secretary appears to have asked previously from a number of zoologists, and what the Commission is now asking from all zoologists, is a very considerable amount of labour, which it cannot reasonably expect many to undertake. To find out the bibliographical references of ca. 50 generic names may involve a very great trouble, especially when old names are concerned —and this will, of course, be a considerable percentage of the names, it being especially the old names about which there is nomenclatorial trouble. Probably not many will be able to afford the necessary time for such a work, and to do it just at the moment they are asked to! For many zoologists it would be nearly impossible to get access to the literature necessary for the purpose—not to speak of the fact that only systematists can be expected to have any routine in that kind of work! In short, what the Commission here has demanded is not very far from an absurdity.

As stated above, the number of the 'Zool. Anzeiger' in which the invitation has appeared was published on the 22nd November; it must certainly be supposed that many zoologists did not see the number before about the middle of December or even later—but the list had to be prepared before the *1st* January! In the 'Annals' the note was published in December, and in this case the list had to be sent in by the *1st* of November!

We may, then, expect that the result of this invitation will be as poor as that of the Secretary's previous efforts. But if the Commission concludes therefrom that the desire to have the more important zoological names protected against change is not very general among zoologists, that conclusion is certainly ill-founded. On the contrary, it is doubtless the desire of the great majority of zoologists to have the more important, commonly used names protected against the tyranny of this rule of priority, which leads to such extremely unfortunate results when carried out literally in all cases *. It may, perhaps, also be justifiable to ask how or wherefrom

* To name only a few of the consequences of the strict application of the priority rule: we must not hereafter speak of Actiniæ, because the name *Actinia* was first used for a Holothurian; the Actiniæ shall now carry the beautiful name "Priapidæ." *Holothuria*, on the other hand, was, strictly taken, first used for a Salp; therefore the Holothurians are hereafter to be called "Bohadschioideans"; likewise the Salps are blessed with a new name, "Dagysidæ." The name *Rhombus*, used for 2000 years for the turbot, and even used binominally for a hundred years before Linnæus, shall be given away to a genus of molluscs, because it was so used in 1797 (by Humphreys), while Linnæus gave the name *Pleuronectes* to all flat-fishes.

this Commission of Nomenclature has obtained its mandate as international. This part of the question may, however, be passed over, since everybody doubtless will agree that it is most desirable to have the zoological nomenclature regulated by international rules. But the condition should be that such rules are reasonable, which does not hold good for the strict application of the priority rule in the opinion of many zoologists. *Of how many?*

A way of ascertaining how many zoologists desire to follow the priority rule strictly in all cases and how many want to have the more important names excepted from the rule would be to send an inquiry round to all zoologists of the world—and it would involve no trouble worth speaking of to the zoologists asked to answer the question. In this way a reliable proof of the position of the majority of zoologists towards this much disputed rule might be obtained.

That it will be possible to carry out such a general vote without great difficulty seems beyond doubt, and as a proof of this is here offered the vote of the Scandinavian and Finnish zoologists.

The result of the vote is very striking. Of the 122 names there are 2 (two) for the strict application of the priority rule in all cases, which means less than 2 per cent. It may, perhaps, not be unreasonable to conclude from this result that the number of those zoologists who swear to the strict application of the priority rule is upon the whole very small, the great majority wishing to have the more important names preserved unaltered.

It is to be hoped that the zoologists of other countries will follow the example given here. When this has been done, and it has been definitely proved that the great majority object to the strict application of the priority rule, it may perhaps be expected that the tyranny of that notorious law, which has already done so much harm to science, will be thrown off; and then, perhaps, the International Commission will see that it is rather its duty to arrange for the codification of the desired names in accordance with the wishes of the zoologists.

It should be pointed out that for the above introductory notes the author (Dr. Th. Mortensen) is alone responsible.

He begs to offer his sincere thanks to the following colleagues, who have assisted him in collecting the names :— Prof. A. Appellöf, Prof. O. Carlgren, Dr. A. Luther, Dr. O. Nordgaard, Dr. I. Trägårdh, Prof. H. Wallengren, and Dr. A. Wollebæk.

One of the chief difficulties in arranging this vote has been

in drawing the limit. It has been thought best to apply mainly to the professional zoologists, not including anatomists, palæontologists, or amateur zoologists. But, upon the whole, it can scarcely be denied that the vote here offered gives really the opinion of the zoologists of Denmark, Finland, Norway, and Sweden. TH. MORTENSEN.

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THE undersigned Scandinavian zoologists are of opinion that the law of priority should be strictly applied in all cases.

SIG THOR,
Dr. phil., Skien, Norway.

E. WAHLGREN,
Dr. phil., Malmö, Sweden.

THE undersigned Scandinavian and Finnish zoologists protest against the strict application of the law of priority in all cases, and express the desire that the most important and generally used names should be protected against any change on nomenclatorial grounds.

GOTTFRIED ADLERTZ,
Dr. phil., Lektor, Sundsvall, Sweden.

K. A. ANDERSSON,
Dr. phil., Fiskeri-Intendent,
Göteborg, Sweden.

L. GABR. ANDERSSON,
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A. APPELLÖF,
Professor of Zoology at the University of Uppsala, Sweden.

EMILY ARNESEN,
Dr. phil., Conservator at the Zoological Museum, Christiania.

I. ARWIDSSON,
Dr. phil., Fiskeri-Intendent,
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CHR. AURIVILLIUS,
Professor, Secretary of the R. Swedish Academy of Sciences, Stockholm.

HUGO ÅGREN,
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KRISTINE BONNEVIE,
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AUG. BRINKMANN,
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HJALMAR BROCH,
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Oscar Carlgren,
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R. Collett,
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Knut Dahl,
Bergen.

Asger Ditlevsen,
Mag. scient., Hellerup, Denmark.

Hjalmar Ditlevsen,
Mag. scient., Assistant at the Zoological Museum, Copenhagen.

Carl Dons,
Conservator at the Museum of Tromsö, Norway.

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Mag. phil., Zoological Institute, Helsingfors.

Sven Ekman,
Dr. phil., Lektor, Jönköping, Sweden.

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Dr. phil., Lecturer on Zoology at the University of Helsingfors.

Runar Forfius,
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H. Kiær,
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## BIBLIOGRAPHICAL NOTICE.

*The Life of Crustacea.* By W. T. Calman, D.Sc. With 32 Plates and 85 Figures. London: Methuen & Co.

If we may judge by the appalling annual output of books on "Popular" Natural History, the thirst for information, on the subject of animal life especially, must be insatiable. This apparent demand for more, and yet more, books of the kind is probably born of unsatisfied desire, for there can be no question but that the bulk of the volumes which flood the market are worthless, or worse than worthless, being the product of mere compilers, few of whom have even an elementary first-hand knowledge of the themes on which they write. That the remedy for this unfortunate state of affairs is in the hands of the trained zoologists may be true enough, but most of those so qualified are men to whom leisure is unknown and whose literary efforts are absorbed in preparing essays of a highly technical character. As a consequence, even when so minded, such men commonly prove but indifferent expositors when they address themselves to the layman. That Dr. Calman is a happy exception to the rule is found by his volume on the 'Life of the Crustacea,' which is a model of what such a book should be; and his success is all the more to be applauded because the Crustacea appeal probably more to the palate than to the sentiments of the layman. To him the toothsome lobster, the crayfish, the crab, and the shrimp are not "Crustacea" but "shellfish," and to him the only other "shellfish" are oysters and the like! But even to those who are by no means unfamiliar with the "Crustacea" Dr. Calman's book will prove hardly less of a revelation, for he has contrived to crowd these most seductive pages with facts that are to be found elsewhere only in learned treatises and clothed in unfamiliar language.

In a small octavo volume of less than 300 pages it is obvious that Dr. Calman has had to exercise no little care and ingenuity in the selection of his material; and a very cursory glance through his pages will suffice to show that in that selection he has displayed a singularly discriminating judgment, for he seems to hit upon just that aspect of his subject which is bound to interest his readers.

It is difficult in the case of a volume where the standard of excellence is so high to single out any particular chapter as being one of more interest than another, and still more difficult to select particular facts from any particular chapter as especially deserving of comment. Any such selection must always be determined by the leanings of the critic. Let it suffice, then, to say of this volume that its aim is to set forth the salient features in the life-history of the Crustacea, and that therefore purely morphological facts are

left untouched. For the sake, however, of affording a standard of comparison between the more typical crustacean and those which, in response to the demands of changed environment, have become more or less structurally modified, Dr. Calman has given an introductory chapter on the lobster as "a type of Crustacea," and this he follows up by a second chapter on classification. If those who are introduced to the study of the Crustacea for the first time through these pages will carefully read these two chapters they will discern in those on metamorphosis, the Crustacea of the deep sea, of the open ocean, and the fresh waters, an aspect of the plasticity of living organisms hitherto undreamed of—an aspect elusive, yet real. Thereby, perchance, new interests will be aroused, and a new and wider view of the mystery of life will certainly be attained.

But this volume will appeal not merely to those to whom it is primarily addressed, for now-a-days most of us are specialists, and this means that we cannot keep abreast of the work done by our fellows at work in fields other than our own. If, then, we would gather stimulus by an exchange of thought, we have to turn to just such a volume as this for inspiration—a volume devoid of the technicalities which are current coin only among that particular community of coiners interested in its circulation.

Readers of the kind just referred to will long have been familiar with the phenomena of phosphorescence in the animal kingdom, but to some perhaps it will be new to learn that the deep-sea prawn *Heterocarpus alphonsi* pours out copious clouds of "a ghostly blue light of sufficient intensity to illuminate a bucket of sea-water so that all its contents were visible in the clearest detail." But neither Dr. Alcock, who originally described the fact, nor Dr. Calman, who again records it, seem to have any idea as to the nature of the matter from which this light emanates. His remark on the colours of deep-sea Crustacea should be carefully pondered over by those coloration enthusiasts who insist that all colours, whatsoever, in animals have been evolved for the purposes of protection. In connection with the story of the significance of coloration, one naturally turns to seek for what obtains among the Crustacea in regard to modifications of form for protective purposes, and they will find under this head some extremely striking facts. One is tempted to demonstrate the statement by quotations, but this review has already attained a somewhat unusual length; hence we refrain. Enough surely has been said to show that it is certainly a book not merely to read, but to possess.

The illustrations, we hasten to add, are not only numerous, but exceedingly well done, while the "get-up" of the book leaves nothing to be desired.

## PROCEEDINGS OF LEARNED SOCIETIES.

### GEOLOGICAL SOCIETY.

June 14th, 1911.—Prof. W. W. Watts, Sc.D., M.Sc., F.R.S., President, in the Chair.

The following communication was read:—

'Notes on the Culm of South Devon: Part I—Exeter District.' By Frederick George Collins, F.G.S.; with a Report on the Plant-Remains by E. A. Newell Arber, M.A., F.G.S., and Notes on the Cephalopoda, by George C. Crick, Assoc.R.S.M., F.G.S.

The object of this paper is to show that the fauna of the Culm Measures of South Devon proves these beds to be the equivalents of the Pendleside Series of the Midlands, as has been shown by Dr. Wheelton Hind to be the case with the Culm Measures of North Devon. The area from which these fossils have come may be roughly described as a narrow strip of country 17 miles long, running from south-west to north-east, having the city of Exeter as its centre. The work has extended over ten years, and innumerable sections have been examined without result. The actual fossiliferous localities are 18 in number, but often the fossils are too poor for determination. Plant-remains are abundant, but determinable specimens very rare; the preservation of the fragments is often excellent, although the fragments themselves are insufficient for specific determination. Such fossils as have been determined show a sequence from below upwards as we go from south to north; but it seems advisable to seek more evidence, and an attempt will be made by working due north from Waddon Barton, a point farther to the west, when, if the attempt is successful, another communication will be offered to the Society.

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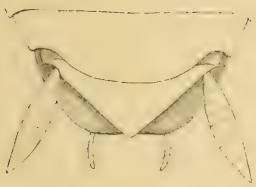
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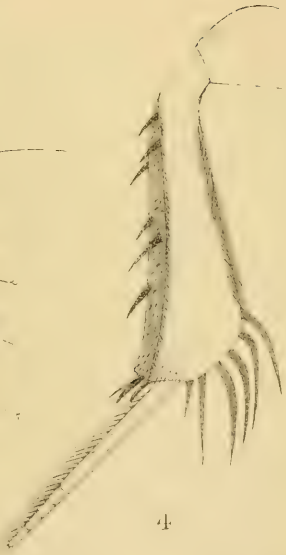
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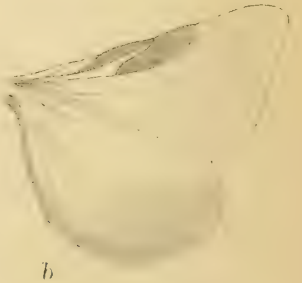


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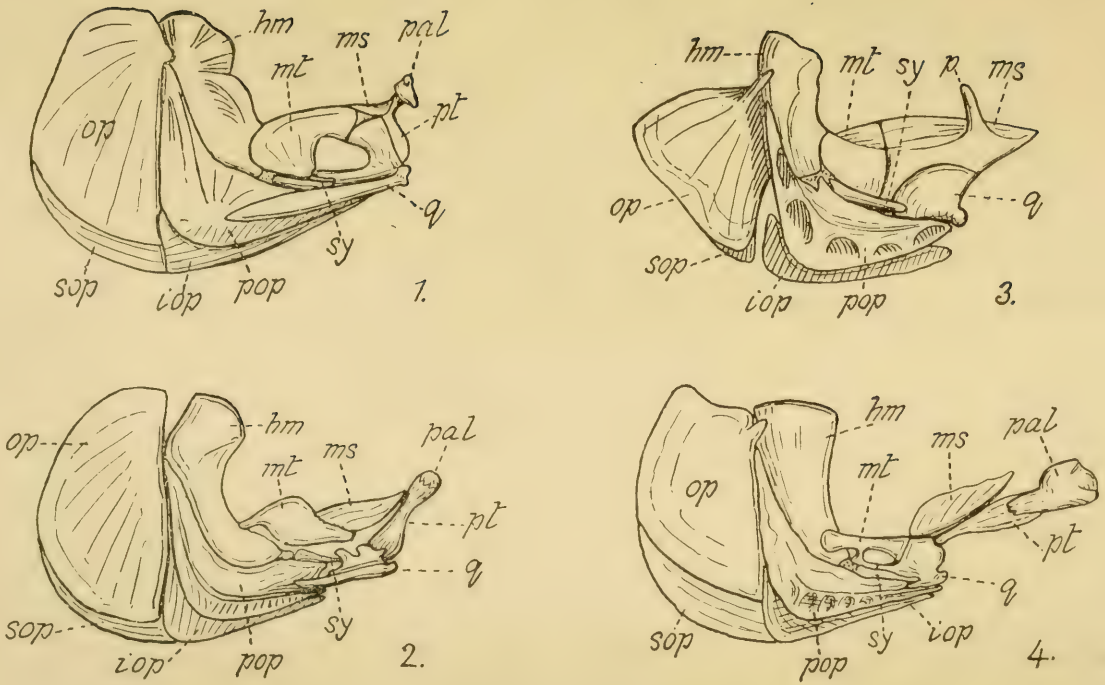
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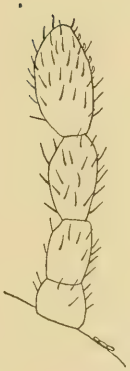
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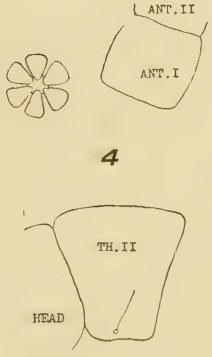
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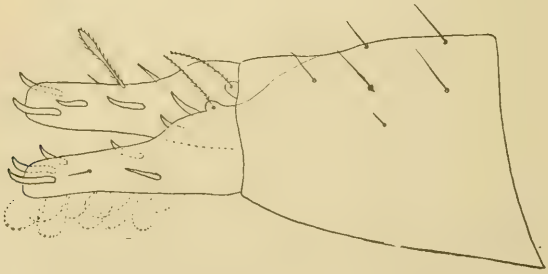

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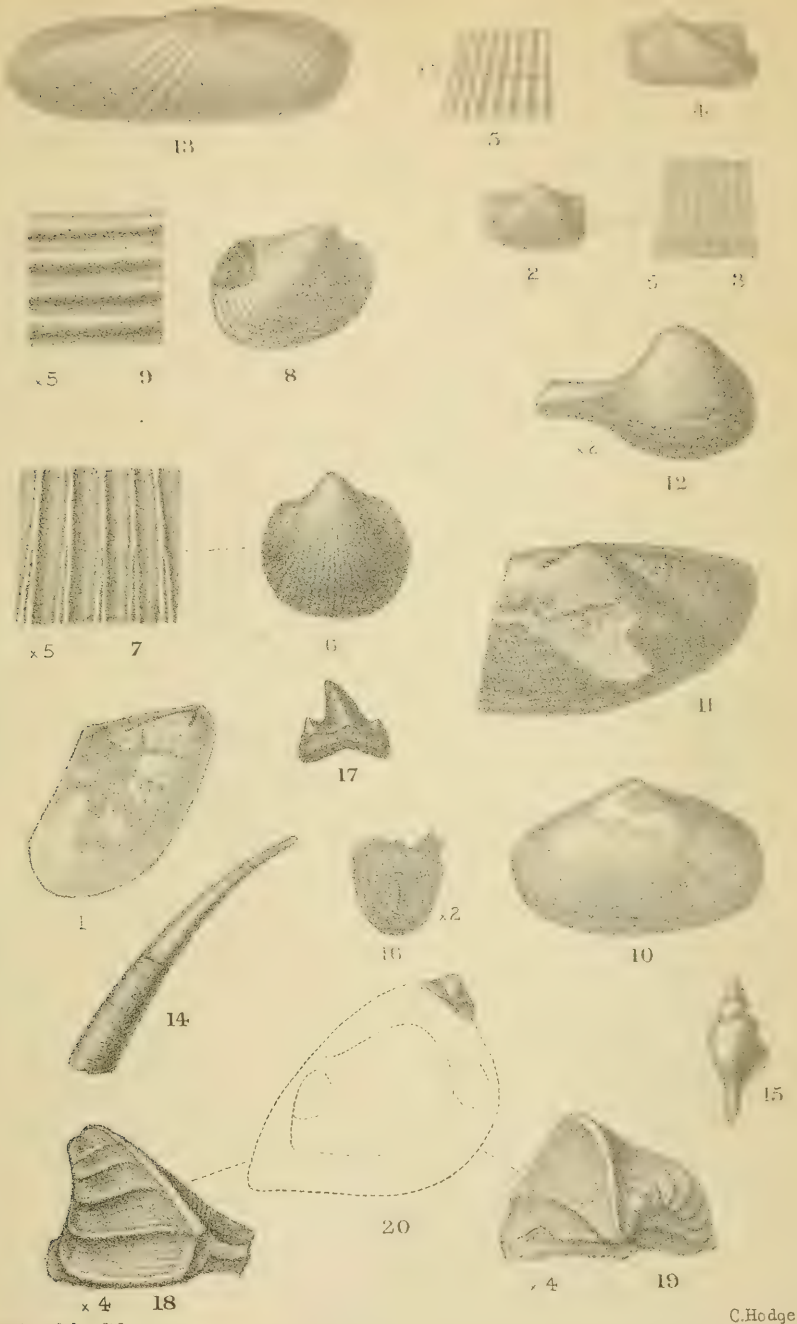

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(Natural size.)




DYNASTINÆ.

(Slightly reduced.)



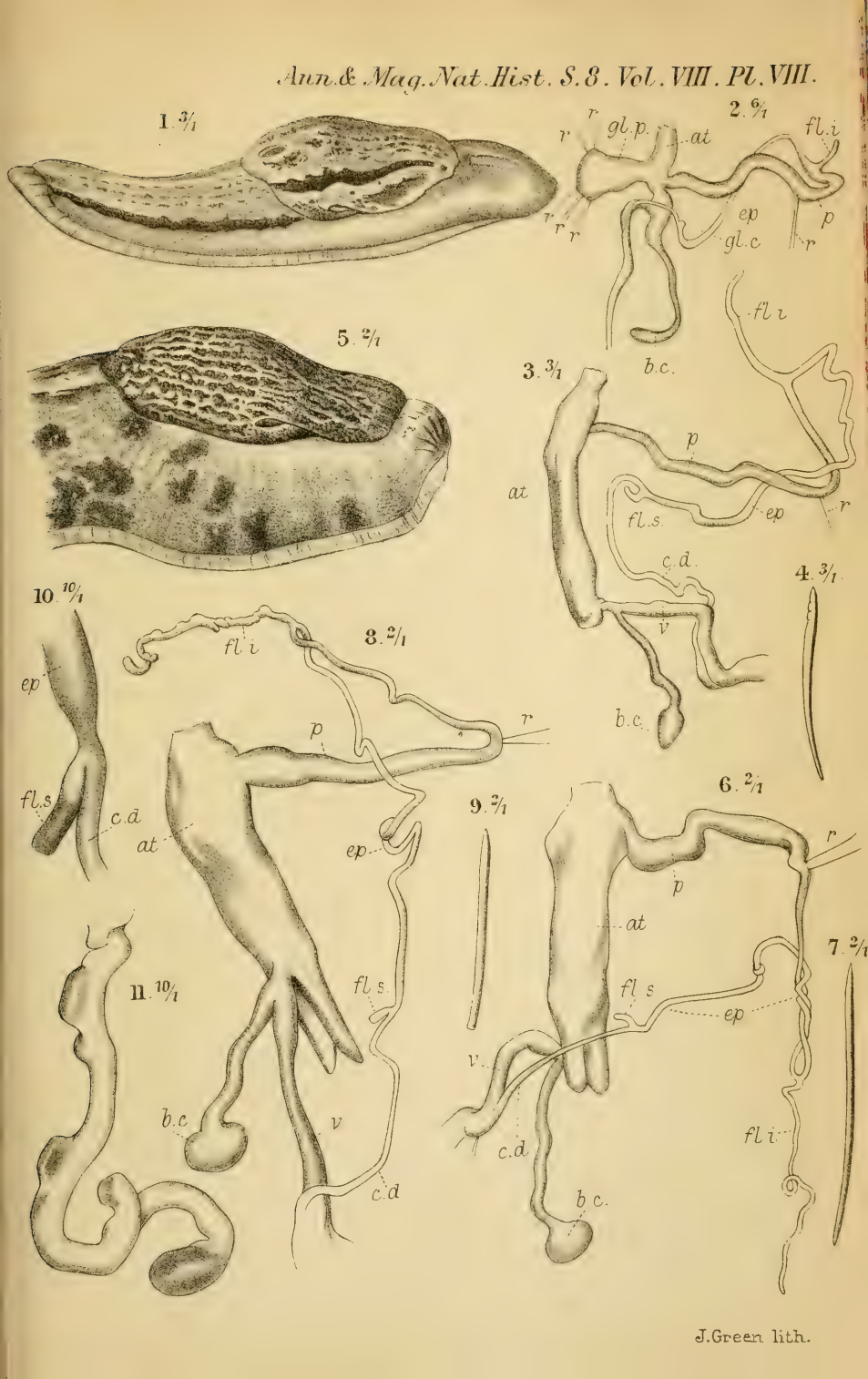

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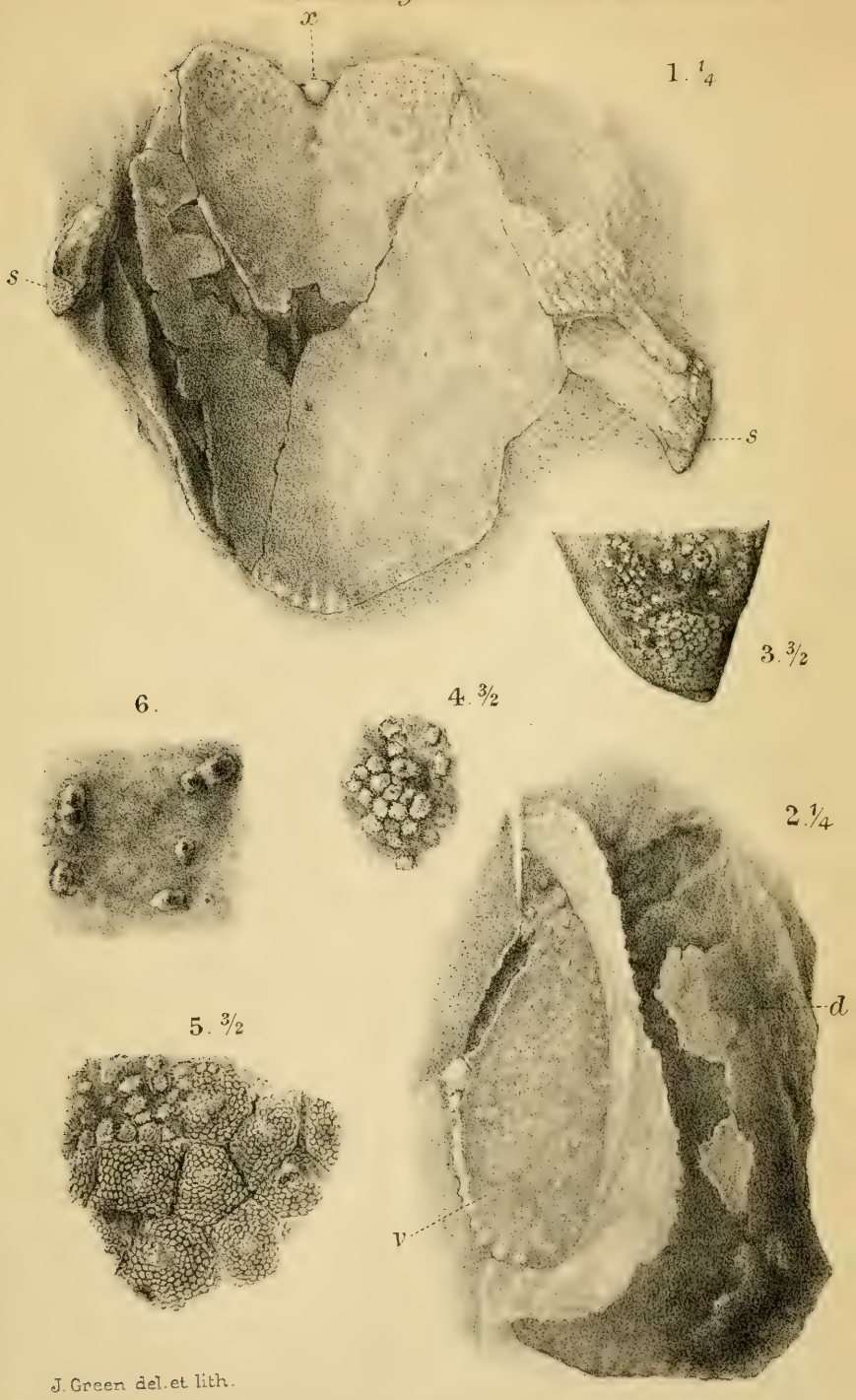
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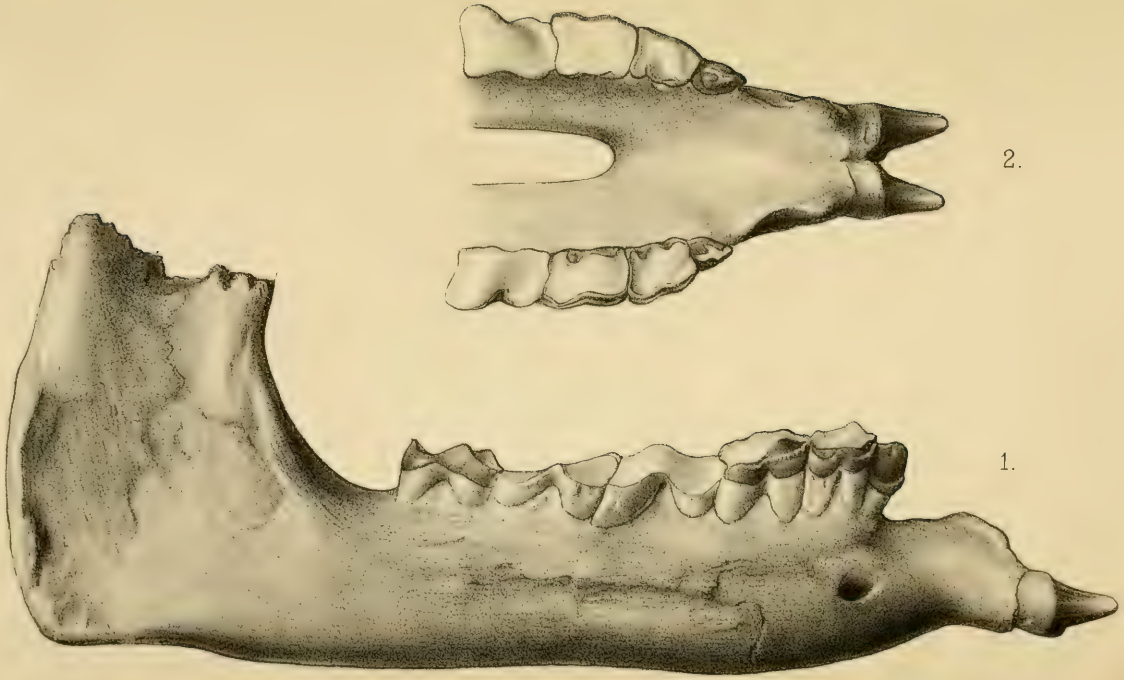

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2. ,, ,, *Upper surface of front portion of ramus.*

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